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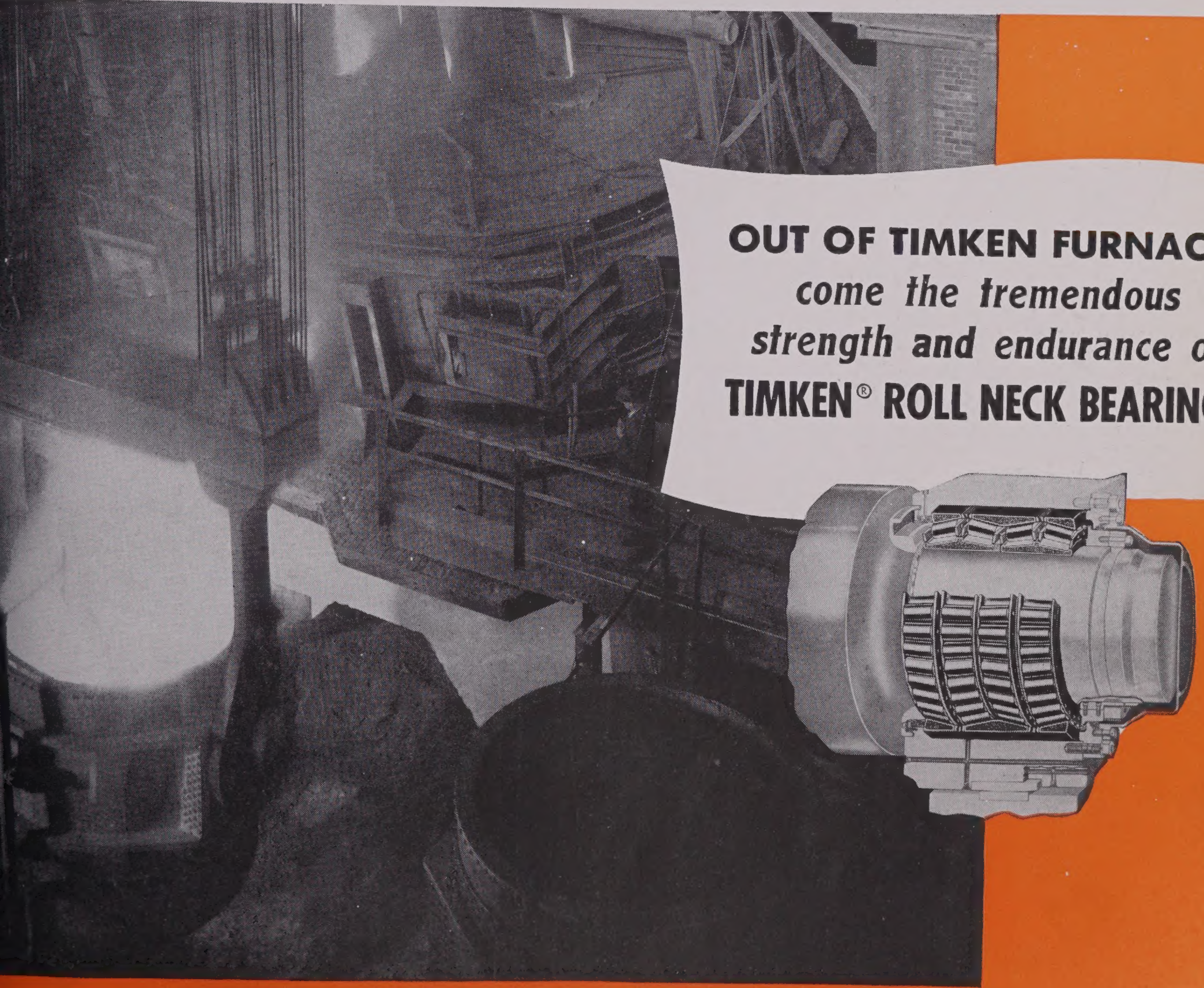
Illinois U Library

The IRON AGE

MARCH 3, 1949



OUT OF TIMKEN FURNACES
come the tremendous strength and endurance of
TIMKEN® ROLL NECK BEARINGS

Every pound of steel that goes into Timken roll neck bearings is melted in Timken steel furnaces.

Made to a modified Krupp formula developed in our metallurgical laboratories, this fine alloy steel is the ideal material for its job. It is largely responsible for the unequalled performance of Timken bearings in rolling millions of tons of steel at the lowest cost per ton ever recorded.

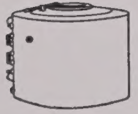
This steel, plus Timken balanced proportion design, has kept Timken roll neck bearings well ahead of advanced developments in rolling mills themselves. Thus Timken balanced proportion bearings made of Timken special alloy steel show load ratings up to 40% higher than formerly; they also possess 50% to 60% greater neck strength, resulting in greater mill and bearing rigidity and thereby higher rolling precision.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
ROLL NECK BEARINGS

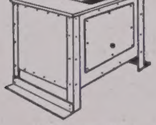
For further information consult your mill builder or our engineers. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address, "Timrosco".

NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

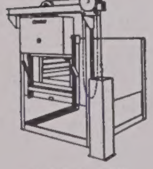
GET UNIFORM DISTRIBUTION OF HEAT



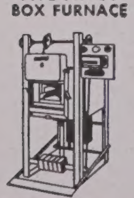
TYPE FR POT FURNACE



TYPE OR-104
POT FURNACE



TYPE FR-251
BOX FURNACE



TYPE FR-206, 207, 208
BOX FURNACE

with Hoskins
CHROMEL*—equipped electric furnaces

Good, dependable performance . . . uniform distribution of heat . . . efficient, low-cost operation and maintenance. These are the basic characteristics built into every Hoskins electric furnace. Look at 'em. Their sturdy, rugged construction bespeaks a long and useful life. Check their insulation. You'll find it where it's needed . . . to hold heat in, keep power costs down, assure more comfortable working conditions. Then consider their heating elements. *Durable CHROMEL heating elements!* Designed to give you maximum heating efficiency, long-life trouble-free service. Designed for quick and easy replacement when at last required. Designed from end to end to *fit* the furnace that *fits* your heat treating operations! Our Catalog-59R describes the complete line of Hoskins electric furnaces . . . want a copy?

*CHROMEL . . . the *original* nickel-chrome alloy that *first* made electrical heating practical.

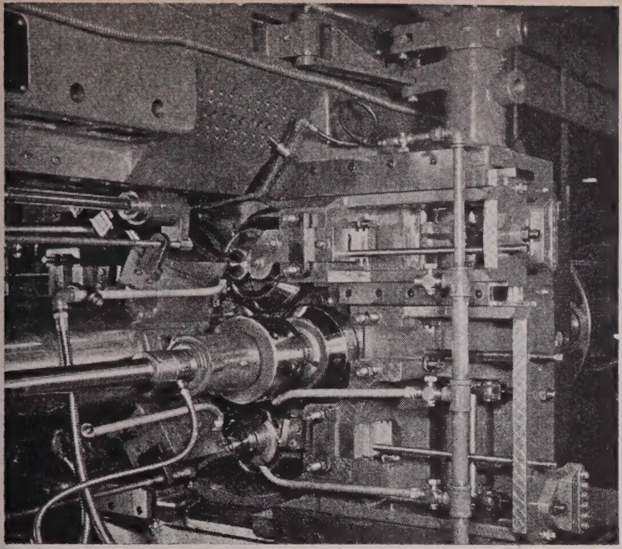
HOSKINS MANUFACTURING COMPANY

4445 LAWTON AVE. • DETROIT 8, MICHIGAN

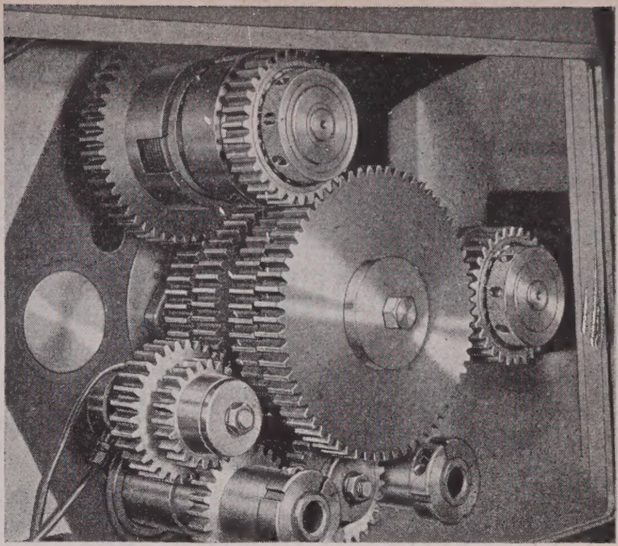
Heating Element Alloys ★ Heat Resistant Alloys ★ Thermocouple Alloys ★ Spark Plug Electrode Wire ★ Special Alloys of Nickel ★ Electric Heat Treating and Laboratory Furnaces

Chromel
nickel-chromium wire

THE IRON AGE, published every Thursday by the *CHILTON CO.* (*INC.*), Chestnut and 56th Sts., Philadelphia 39, Pa. Entered as second class mat
Nov. 8, 1932, at the Post Office at Philadelphia under act of March 3, 1879. $8 yearly in United States, its territories and Canada; other West
Hemisphere Countries $15; other Foreign Countries $25 per year. Single Copies 35¢. Annual Review Number, $2.00. Vol. 163, No. 9.



Full Swing for Main and Auxiliary End Slide Standard and Special Tool Mountings



Cone "Full-Choice" Open End Attachment Drive

IS HALF A LOAF BETTER THAN ONE?

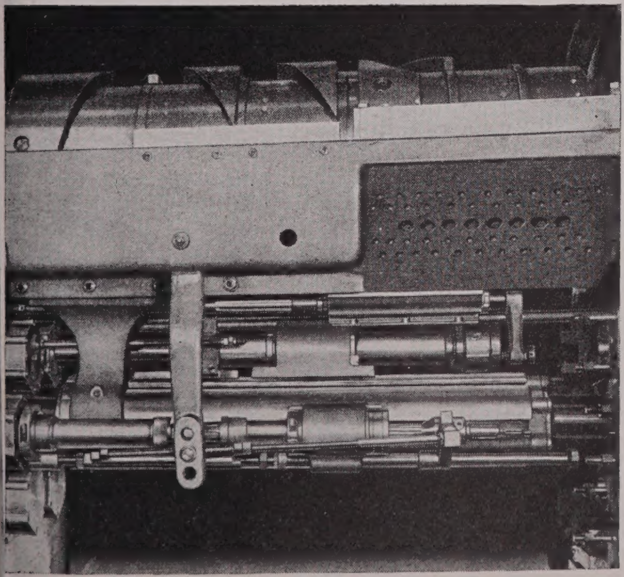
Machine capacity can usually be measured by tooling accommodation. The facility available to handle the job will determine a machine's dollar value.

Lack of a "full choice" accommodation of tooling positions for endworking tools and attachments can be a costly handicap to a multiple spindle automatic. The inability to swing to full collet capacity die heads, hollow mills, trepans, and internal necking tools, can limit a machine's usefulness on many jobs from zero up. Like half a loaf — better than none, but much less than one.

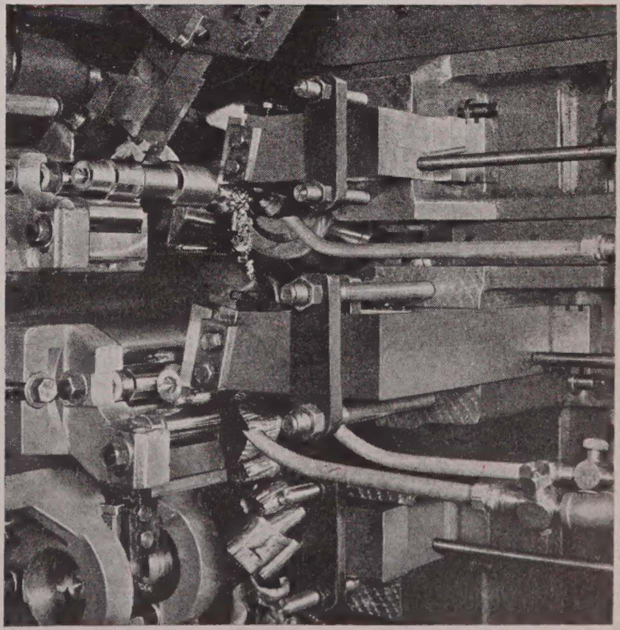
The "full choice" tooling accommodation of Conomatic cross slides, main end slides, auxiliary end slides and endworking attachment drive positions, are worth checking.

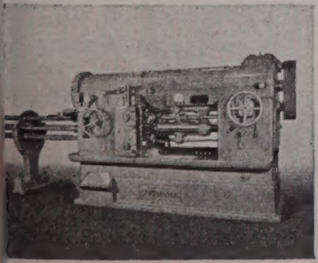
Write to Cone for Buyer's Chart which lists overall requirements of Multiple Spindle Automatics.

"All-Position" End Attachment Mounting



Standard Forming Slide and Auxiliary Cross Slide Facility





A comparison with ALL Automatics

will lead you to

#6

Conomatic

CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

Have you considered how this man can lower the cost of your springs?

THE gentleman pictured above represents Accurate's production-conscious engineers who are continually searching for ways to reduce your spring costs. Their record is an enviable one, too. Scores of manufacturers making all types of products have profited by Accurate's "know-how." We'd like to tell you about actual cases in which we have saved our customers substantial amounts. And, of course, we'd like to point out what we can do for you. Write, wire or phone, today.

Accurate Springs

A dependable source of supply!

ACCURATE SPRING MFG. CO.
3819 W. Lake St. • Chicago 24, Ill.

Springs, Wire Forms, Stampings

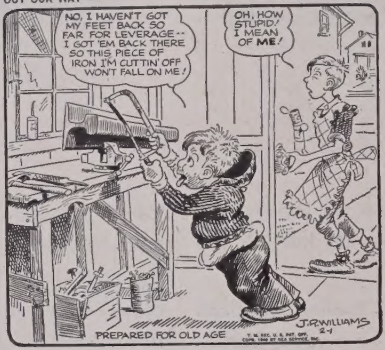
Fatigue Cracks

BY C. T. POST

Well, Mr. Williams?

• • Every so often an alert reader successfully challenges the brains department on the technical accuracy of material appearing to the east of this department. Never to our knowledge, though, has anyone caught J. R. Williams, who draws Bull of the Woods, with his pencils down. With years of actual machine shop experience behind him, Mr. Williams can spar on even terms with any tool engineer in the country.

OUT OUR WAY BY J. R. WILLIAMS


NO, I HAVEN'T GOT MY FEET BACK SO FAR FOR LEVERAGE-- I GOT 'EM BACK THERE SO THIS PIECE OF IRON I'M CUTTIN' OFF WON'T FALL ON ME!
OH, HOW STUPID! I MEAN OF ME!
J.R.WILLIAMS 2-1
PREPARED FOR OLD AGE
T. M. REG. U. S. PAT. OFF. COPR. 1949 BY NEA SERVICE, INC.

Undaunted, Jerry Singleton, assistant to the president, Pressed Metal Institute, attacks on another flank. Clipping this Williams "Out Our Way" cartoon from a Cleveland paper Singleton asks, "How did the small fry get that piece of rail up in the vice?"

Since your f.f.j.'s only vices are vises, we'll have to call the marines on that. Any suggestions?

Music in the Air

• • Ever since the Presbyterian Church up in a N. Y. suburb hooked a powerful amplifier in the organ loft to a big speaker in the steeple, the Sunday morning air has been filled with the sweetest chimes this side of NBC. It's the sort of thing that would draw Vishinsky, if he could hear it, right into the front pew looking for religion.

But it was a Saturday afternoon a couple of weeks ago that the surrounding neighborhood suddenly was filled with the rollicking strains of the "Beer Barrel Polka." By the time residents had run from their houses, expecting to see a passing sound truck, and traced the sound without difficulty to the Presbyterian steeple, the rhythm had shifted to bebop.

The church, it should be explained, sponsors a broad-minded social program among its young people. Occasional gatherings in the church clubrooms are livened with juke-box dancing as well as more intellectual endeavors. The organ loft amplifier embodies a record turntable. Exactly how the juke-box records got into the organ loft, and how the amplifier happened to be turned on is not clear.

But if Beezelbub was around town that Saturday afternoon, his confusion must have been terrific.

Hello

"The multiple basing points system," says the Federal Trade Commission, "provides a useful instrument for price fixing."

After long research, the brains department comes up with this rejoinder: "So does the telephone."

Hot?

• • Your f.f.j.'s California buzzsaw, R. Raymond Kay, sends along the latest southern California yarn, apparently bred during the recent cool spell when the boys were warming their hands in front of the fire.

A Los Angeles machinery distributor was giving his eastern supplier the V.I.P. tour of Hollywood, Beverly Hills and the Santa Monica beaches. For three days the distributor called attention to everything that was "the largest," "the world's biggest," or "most outstanding."

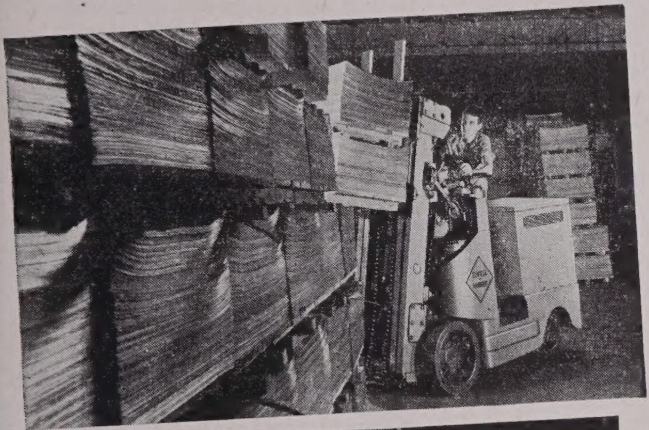
With great relief, the manufacturer finally packed and prepared to leave. As he climbed the ramp to the waiting airplane, the distributor let fly his parting plug for the Golden West: "And don't forget you're taking off into the world's biggest air!"

Down Curve

• • It's not often that the news department misses a reading on a business barometer, but we might as well be the first to point out to a big metal consuming industry that its sales curve is going to go down. Through the U. S. Department of Agriculture we learn that the manufacture of chewing tobacco in 1948 is estimated at 95 million lb compared with 98½ million in 1947. Forty-eight was the lowest year on record, with less than ¾ lb for every man, woman and child.

Although wholesale chewing tobacco prices are 30 pct above prewar, you can credit this department with a bulls-eye on its forecast that the cuspidor market is going to be pretty spotty in the months ahead.

BIG SAVINGS made with ELWELL-PARKERS!



Saves $20.65 For Each Car Unloaded

This direct labor saving was made when handling by an E-P truck replaced manual unloading of sheet metal. Master unit loads weighing 2,500 lbs. are now high tiered, with greater safety, and in less time.

Saves $64 Daily By Using "AIR RIGHTS"

Profitable use of *all* overhead space is achieved by warehouse owner whose E-P trucks high tier palletized barrels. These hazardous-to-handle units are safely stored in this manner. Savings—$64 in 8 hours.

Saves $41 Per Car By Palletization

Unloading boxcar, 1 bag at a time, was slow, expensive and wasteful due to broken bags. After supplier palletized, an E-P truck unloaded cars so quickly and economically that it soon repaid its cost.

Because of their reliable performance, Elwell-Parkers have been making these economies for years—today the savings are *even greater* as compared to less efficient and less dependable methods. The Elwell-Parker Electric Company, 4225 St. Clair Avenue, Cleveland 3, Ohio.

Industrial LOGISTICS

FREE BOOKLET
on Scientific
Materials Handling.

Ask for a copy of
"Industrial Logistics"

ELWELL-PARKER
POWER INDUSTRIAL TRUCKS
Established 1893

More than a Product . . .

. . . a *Production Idea*

Here's something *you should know* about *pre-coated* Thomas Strip.

It's more than a product—it's an easy-to-use idea that speeds up production and cuts costs.

You see, *pre-coated* Thomas Strip comes to you all ready for immediate fabrication into finished and semi-finished steel parts.

So . . . here's the idea. You can put Thomas Strip right on your production line . . . with no preliminary preparation. And, parts coming off the line have that tight, undamaged Thomas electrocoating which can serve as a final finish or as a ready base for further plating or painting.

Thus, you by-pass several costly, time-consuming operations . . . and, as a result, enjoy increased output of your finished product at lower unit cost.

THE THOMAS STEEL COMPANY
WARREN, OHIO
Specialists in Cold Rolled Strip Steel

Thomas Strip

COLD ROLLED STRIP STEEL

Electrocoated with Zinc, Copper, Nickel and Brass • Hot Dipped Tin and Lead Alloy • Lacquer Coated in Colors • Spring Steel • Alloy Strip Steel SAE Grades • Produced to Your Specifications

Speeds Production...

Cuts Costs

Dear Editor:

TITANIUM PAPERS

Sir:

This Office has been deluged with hundreds of requests for copies of the papers presented at the Office of Naval Research Symposium on Titanium, partially as a result of your excellent series of articles, in the Dec. 23, Dec. 30 and Jan. 13 issues, concerning the Symposium. As a result of this unanticipated demand, we have had to revise our publication plans.

I would appreciate it, therefore, if you could carry an item in the near future informing those interested as to how the report can be obtained. It is at the printers' at the present time, and will be available for distribution about April 1. The report can be ordered from Supt. of Documents, Government Printing Office, Washington 25.

Requests should be for "Titanium," a publication of the Office of Naval Research. There will be a nominal charge to cover printing costs, and those ordering it will be billed as soon as the price is determined.

JULIUS J. HARWOOD
Dept. of the Navy, Office of Naval Research
Washington

NONFERROUS SCRAP

Sir:

We are interested in obtaining specifications for the various grades of nonferrous metal scrap.

J. BONOCCHI
President
Silver State Surplus & Salvage Co.
Las Vegas, Nev.

● A copy of these specifications as published by the National Assn. of Waste Material Dealers, New York, has been sent.
Ed.

STEEL MILL SCENE

Sir:

On going through the Jan. 6 issue, I noticed the very attractive colored drawing entitled "Night Scene in a Steel Mill." I am curious to know if there are reprints of this picture available. If so, I would like to obtain a copy so that I might have it framed.

K. A. NOLF
Alloy & Stainless Dept.
Joseph T. Ryerson & Son, Inc.
Carnegie, Pa.

● A limited number of reprints suitable for framing are available. Your copy is in the mail.—Ed.

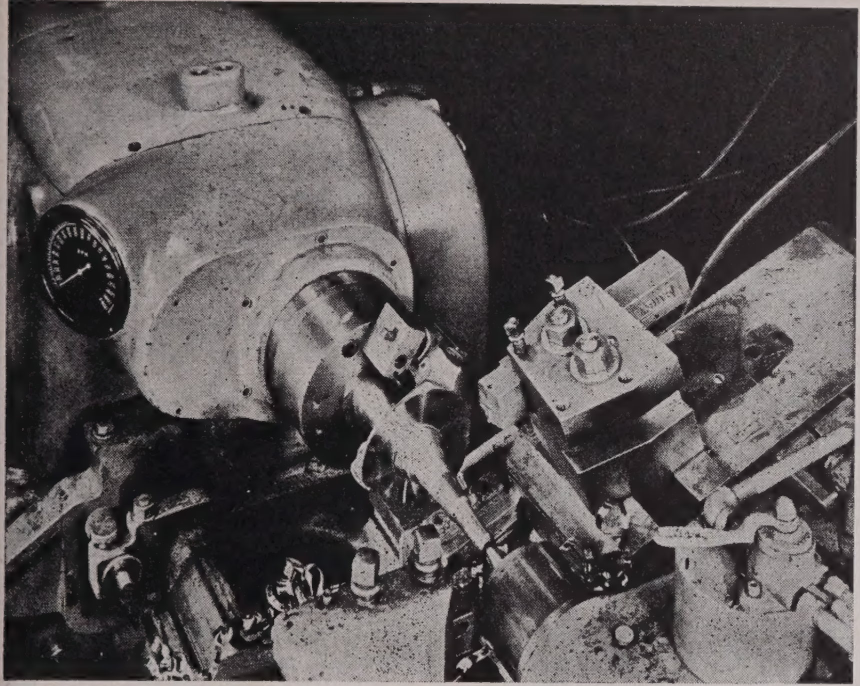
ECONOMIC GEOGRAPHY

Sir:

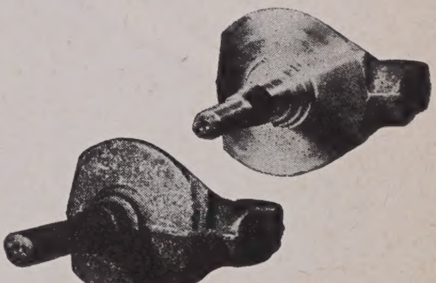
Would it be possible to obtain copies of several of the articles which

(CONTINUED ON PAGE 76)

SAVE WITH SINGLE-POINT TOOLING



Air-gage trace it on the MONARCH MONA-MATIC



You can turn it faster, cheaper, more accurately—on an Air-Gage Tracer-equipped Mona-Matic.

Here's a typical example: forged steering knuckles finish machined in 1.23 minutes—*in one setup.* Performance like this is characteristic of Air-Gage Tracing—the exclusive Monarch method that provides single-point, automatic cycle metal turning for multiple diameter parts.

Expensive forming tools and complicated multiple tool setups are completely eliminated. There's practically no work distortion; the accuracy of this method often reduces *by half* the amount of grinding stock. You'll save on setup time, too—it almost never exceeds fifteen to twenty minutes. What's more, one man can operate two machines—*easily.*

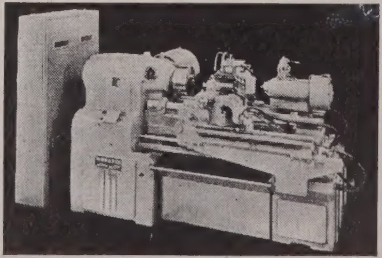
On the steering knuckle job illustrated, full advantage is taken of two optional *plus* features: the two-speed main drive motor permits shifting to half speed at any desired point in the cycle—to maintain finish as the tool moves out along the flange. The rear tool slide is timed to lead the front tool slide, performing a roughing cut on the flange to prolong the life of the front tool.

The second plus feature is the automatic feed change—providing up to five infinitely variable feeds, as required. This flexibility of operation allows maximum machining efficiency in the removal of variable stock, so characteristic of forgings.

The Mona-Matic method is adaptable to a vast variety of workpieces; it has made spectacular savings on many a production line. May we show you how it can help lower your own costs?

JOB FACTS

Part—Steering Knuckle
Material—SAE 3135 forging
Operations Performed—Turn stem complete; face flange
Cutting Tool—Carbide Insert
Tolerance—± .001″
Total Machining Time—1.23 minutes
Note—Two pieces are produced in the above time, as one man operates two machines.



THE MONARCH MACHINE TOOL COMPANY • Sidney, Ohio

ACCURACY · ECONOMY · LONG LIFE
Monarch
TURNING MACHINES

FOR A GOOD TURN *FASTER*—TURN TO MONARCH

For Round and Straight Bores
Uniformly Sized and Finished
MICROHONING*
TOOLS

MICROHONING
is the
QUICKER—BETTER
LOWER COST METHOD
Micromold* Tool and Microsize* Ring
General Purpose Microhoning Tools
Hydraulic Tools
Brake-Type Tools and Adjusting Head
Hydrobrake* Tools with Adjusting Head

MICROMATIC MICROHONING TOOLS

in the range of bore diameter sizes from ¼" to 42", and up to 75 feet long, correct error and generate final roundness and straightness within limits of .0001" to .0003", either by AUTOMATIC or operator control—remove up to .080" stock at rates up to .012" per minute on diameter—and any desired type of surface finish. They are designed and constructed to meet the needs of economical precision production. We can mail further information.

*Trademark Reg. U.S. Patent Office.

MICROMATIC HONE CORPORATION
8100 SCHOOLCRAFT AVE. • DETROIT 4, MICHIGAN
Los Angeles, Calif. • Houston, Texas • Rockford, Ill. • Guilford, Conn. • Brantford, Ont., Can.

appeared in the last annual review issue, dated Jan. 6. The summaries "Iron Ore," "Western Steel," "World Production" and "F.O.B. Mill" would all be of very great value in connection with our advanced courses in Economic Geography. I should very much like to make them assigned reading, but our library copy cannot be made accessible for such purposes.

JAMES J. PARSONS
Dept. of Geography

University of California
Berkeley

● Tear sheet copies are on their way. If a few additional copies would help, we'll be glad to send them.—Ed.

IRON SULFIDE SOURCES

Sir:

I noticed in reading a recent issue that mention was made of powdered iron sulfide, but no reference to the manufacturer was made. We have need of this commodity in our match composition and have been unable to locate any source of supply in Canada. The iron sulfide we have in mind should be 100 mesh or finer. If you could put me in contact with a manufacturer, I would be appreciative.

While I am on the subject of hard-to-get items, would you furnish me with any information you may have on cerium metal, used in lighter flint manufacture. I would like information on both the raw material and already manufactured sticks. Also, Elephant Bronze in gage thickness for making match machine pins is a metal we would like to know more about.

D. F. QUIGLEY
Purchasing Agent

Western Match Co. Ltd.
Victoria, B. C., Canada

● Lists of sources of supply of both powdered iron sulfide and cerium metal have been sent. The companies can give you detailed information on the products. Eleplant Bronze is the trade name of a series of phosphor bronzes made by the Phosphor Bronze Smelting Co., Philadelphia. These contain 0.3 to 0.5 pct P and are used for machinery parts, pinions, piston rods, valves and fittings operating under extreme pressures.—Ed.

F.O.B. MILL PRICING

Sir:

We would appreciate very much receiving a copy of the article "F.O.B. Mill" which appeared in the Jan. 6 issue.

J. F. YUNGERT
Chemioal Engineer

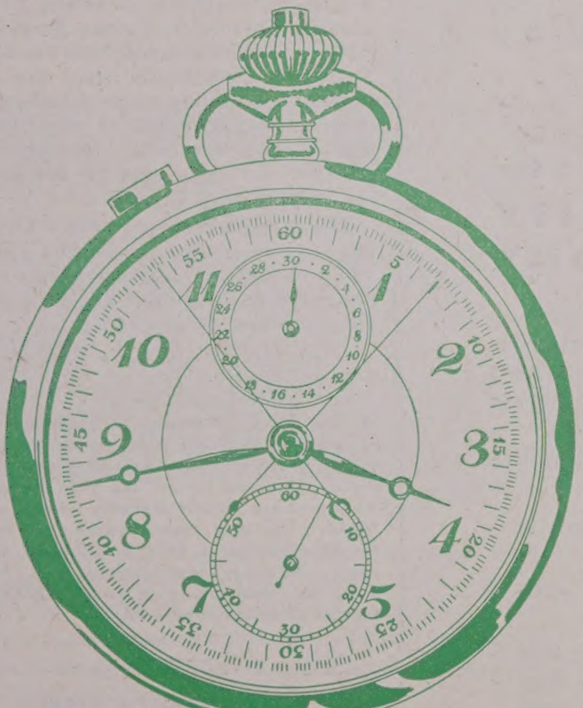
National Can Corp.
New York

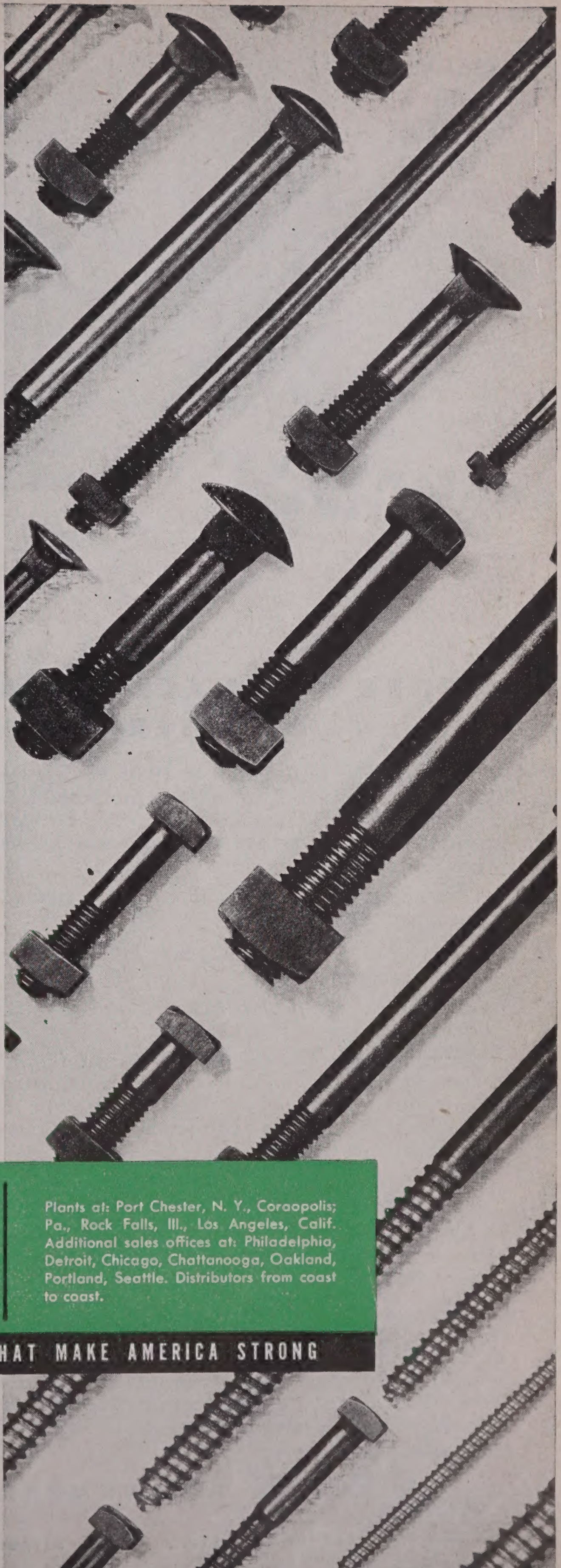
CORROSION PROBLEM

Sir:

In the article "Nonferrous Metals" in the Jan. 6 issue, an illustration shows composite piping systems with various copper units in combination with standard iron fittings. The article states that these combinations

Maximum speed of assembly reduces costs—helps you get *True Fastener Economy*. The *accuracy* and *uniformity* of RB&W Carriage, Machine and Lag Bolts are the products of more than a century of continuous research and progressive development in fastener manufacturing . . . backed by the skill of four generations of RB&W men and women.





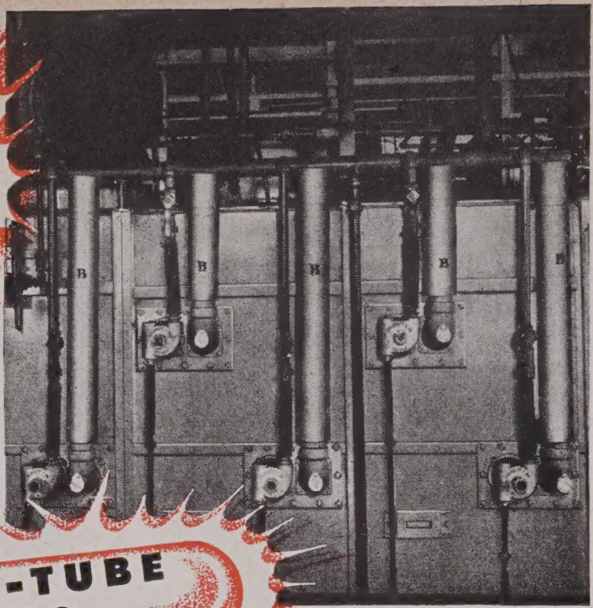
RB&W

THE COMPLETE QUALITY LINE

Plants at: Port Chester, N. Y., Coraopolis; Pa., Rock Falls, Ill., Los Angeles, Calif. Additional sales offices at: Philadelphia, Detroit, Chicago, Chattanooga, Oakland, Portland, Seattle. Distributors from coast to coast.

104 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

RUSSELL, BURDSALL & WARD
BOLT AND NUT COMPANY



BLAZING
THE
HEAT TREAT
TRAIL

The first radiant-tube continuous furnace was built by Holcroft in 1936, and is still producing efficiently. The furnace at right shows the simplicity of the Holcroft radiant-tube installation.

RADIANT-TUBE HEATING

Applied by Holcroft in 1936 for

LARGER FURNACE CAPACITY *with* GREATER ECONOMY

Introduced by Holcroft in 1936, radiant-tube heating of continuous furnaces solved the problem of constructing larger, more durable furnaces for controlled-atmosphere heat treating. This development made possible the high-production furnaces of today.

As applied by Holcroft, this heating method offers the following advantages:

- *Gas, oil or electric firing* may be used, whichever is most economical.
- *Combination oil-gas burners* are available, with quick changeover provided.
- Holcroft burners are of *closed-head design.* Air and fuel are metered, and are progressively mixed as they pass through the tubes. This assures both maximum combustion efficiency and the uniform heating required for maximum tube life.
- The burner design permits *floating control,* with the same superior performance at all rates of heat input.
- All tubes are readily replaced without cooling the furnace; and electric heating elements are replaced without removing the tubes.

These are but typical of the many advantages provided by Holcroft engineering leadership. Each Holcroft furnace is *designed individually* for its specific application, and *complete metallurgical and engineering service* are provided. Thus Holcroft assures *maximum over-all economy* in production heat treat furnaces for EVERY purpose.

SINCE 1916 Holcroft AND COMPANY
BUILT BY HOLCROFT & COMPANY DETROIT-MICH.
PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE
6545 EPWORTH BLVD. DETROIT 10, MICHIGAN

CHICAGO 3
C. H. MARTIN, A. A. ENGELHARDT
1017 PEOPLES GAS BLDG.

CANADA
WALKER METAL PRODUCTS, LTD.
WALKERVILLE, ONTARIO

HOUSTON 1
R. E. McARDLE
5724 NAVIGATION BLVD.

are being sold to buyers of thousands of homes.

I raise the question of possible electrolytic action and accelerated corrosion of the iron piping where the copper meets the iron in the presence of liquids, especially sewage.

WILLARD C. BRINTON

Brinton Associates
New York

● Your concern is well founded. However, builders have considered this possibility and for the most part use fiber insulating washers at the joints where dissimilar metals come into contact. In the particular job illustrated, however, fiber washers were not used since lead caulking separated the metals and the cast iron sections were deemed heavy enough to offer a margin of safety.—Ed.

EMPLOYEE SELECTION

Sir:

One of our friends in France has written us relative to an article, "Personality Factors in Future Employee Selection," which appeared in the Nov. 11 issue. Specifically they are desirous of obtaining more details concerning the selection of employees, and if possible, what Burleigh B. Gardner has been able to devise on the subject.

The thought occurred to us that you might be in position to give us a lead which would aid us in securing the requested data as well as Mr. Gardner's address.

E. A. HENAULT
President & Treasurer

Francosteel Corp.
New York

● The book "Practical Management," a compilation of IRON AGE articles on personnel programs, job evaluation and time study, production control and other management problems, would probably interest your friend. The most recent address we have for Mr. Gardner is 5628 S. Kenwood, Chicago. American Management Assn., New York, can probably suggest additional sources of information.—Ed.

DIRECT SMELTING OF STEEL

Sir:

I wish to ask if you will be so kind as to put me in touch with a manufacturer, or someone, who knows the latest developments in electric smelting of steel direct from the ore.

I have deposits of high grade magnetite ore near low cost electric power, and as there is no steel plant in western Canada yet, I am interested in starting one if direct electrical smelting is economically feasible.

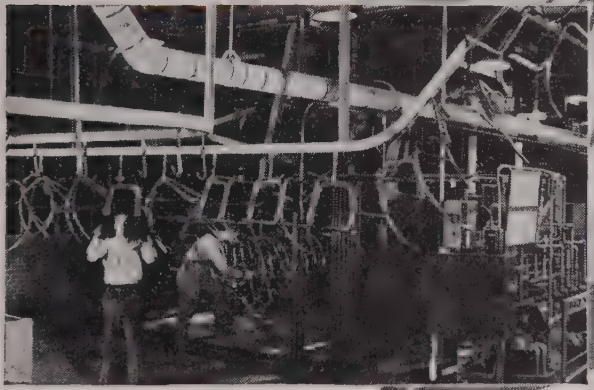
R. T. GILMAN

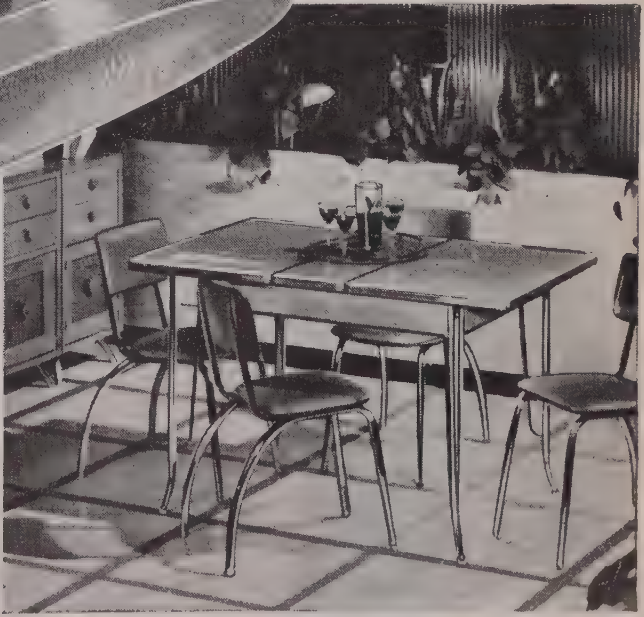
Mayne Island, B. C., Canada

● A number of companies and organizations on this continent have investigated the possibilities of direct smelting; but we know of no instance in which it has been considered economically feasible and actually set up as a production operation. The economic factors involved are ore quality, quality and availability of the reducing agent (several have been tried), the competitive situation in regard to blast furnace

How many Chair Frames in an Hour?

180 beautiful nickel-chrome plated chairs—an average of 1 every 20 seconds!—are turned out by the Udylite Automatic Plating Machine in use at American Fixture and Manufacturing Company.





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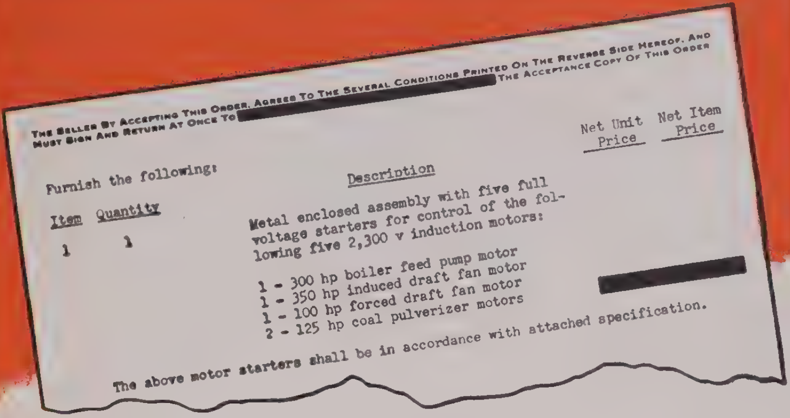

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Furnish the following:

Item	Quantity	Description	Net Unit Price	Net Item Price
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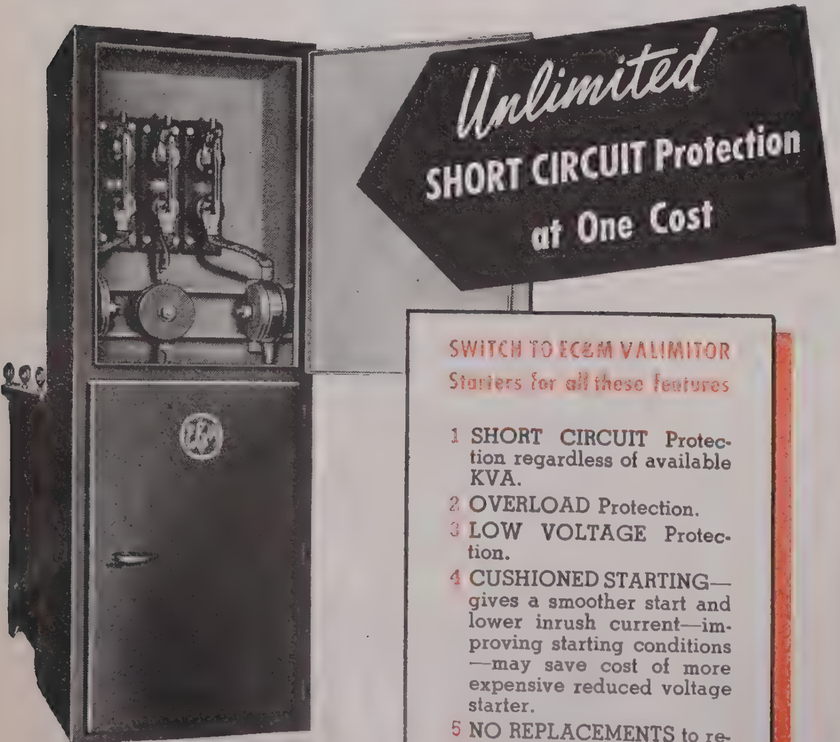
The above motor starters shall be in accordance with attached specification.

"The power circuit which will supply this assembly has a short-circuit capability of 300,000 KVA at 2300 volt, and the units shall be suitable for operation under these conditions," say the specifications. EC&M VALIMITOR Starters not only meet these conditions, but will provide *safe* operation even if connected to a bus of *infinite* available KVA. There's no limit on VALIMITOR protection—no need to calculate present power—no need for revision if KVA grows. They reduce the effect of a "fault" not only on the immediate motor circuit, but limit the fault current clear back to the power source. EC&M VALIMITOR Starters are easy to apply—order them by motor name-plate data.



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production, and, as you suggest, cost of electric power. The article "Swedish Sponge Iron" in the Jan. 20 and 27, 1944 issues describes a similar Swedish operation and includes some cost figures pertinent to your problem. Also, you can probably get further information from the Ontario Research Foundation, Toronto, and the U. S. Bureau of Mines, Washington, as both organizations have investigated such smelting. The name of a Swedish electric furnace manufacturer, particularly familiar with the problems involved and having representatives in this country, has been sent.—Ed.

BRAZILIAN STEEL MILL

Sir:

Please inform me if there is a large steel plant being built in Brazil, South America, by one of the United States steel companies. If so, please inform me the name of the company.

DAN WATKINS
Birmingham

● None of the United States companies is building a Brazilian plant, although several of them have made ore explorations there. You probably have in mind the Brazilian National Steel Co., partly owned by the Brazilian government, which has completed a fully-integrated plant and is planning further expansion. The company is using some American personnel in supervisory positions. Their office in this country is at 570 Lexington Ave., New York.—Ed.

CAM MILLING FIXTURE

Sir:

Will you please send us 30 copies each of "An Unusual Cam Milling Fixture" and "Casting Stainless Steel Centrifugally in Permanent Metal Molds," both from the Jan. 27 issue.

C. H. WHITING
Manufacturing Policy Div.
General Electric Co.
Schenectady

TOOL STEEL DIRECTORY

Sir:

Will you please send us 25 copies of the Directory of Tool Steels. I understand these booklets are priced at $1.00 each in quantities of more than six.

J. J. HAUPTLY
Manager, Alloy Steel Dept.
Joseph T. Ryerson & Son, Inc.
Jersey City

SOLDERING

Sir:

In the Dec. 30 issue reference is made to a Tin Research Institute publication entitled "Notes on Soldering." Will you please send us the address of the Institute so that a copy of this publication can be obtained.

P. S. ROGERS
Research Engineering Section
Harrison Radiator Div., General Motors Corp.
Lockport, N. Y.

● Battelle Memorial Institute, Columbus, Ohio, is the United States representative of the Tin Research Institute and can supply you with a copy of the book.—Ed.

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IRON AGE

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March 3, 1949

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RELIABLE SERVICE

A MEMBER of the President's Council of Economic Advisers, Leon H. Keyserling, has recently hit the headlines with the horrific warning that another depression might cost the country $800 billion. This is a little more than three times the present federal debt, about twice the pre-war value of all reproducible wealth in this country, and probably exceeds the total cost of the recent war. Dr. Keyserling was apparently determined that no one should accuse him of understatement.

We hardly know how anyone goes about the task of estimating the cost of a depression. Is it the cost of relief, the overhead charges for idle plants, the loss in market value of farms, real estate and securities? Is it the value of merchandise not produced, goods not consumed, physical growth and value appreciation not realized? The cost of a depression is obviously an illusive figure. Possibly for that reason precisely, an imaginative observer can speak freely—it would be difficult to prove him wrong.

However, this estimate by the "liberal" member of the Council should not be ignored. There is more here than meets the eye.

With a business adjustment of unpredictable proportions at our door step, something must be done about it. This is the meaning of the "affirmative democracy" to which our more enlightened economists have been paying glowing tributes.

An "affirmative democracy" means, among other things, that if anyone yells—particularly if he is a member of an important voting group—the government must do something about it. This applies to farmers whose crops shrink in value, to workers without jobs, to veterans with inadequate incomes, to citizens who live with their in-laws, to well-meaning people who wish to promote democracy elsewhere or raise the living standards of laggard races.

These laudable objectives require money. Since the end of the war there has been a deplorable recrudescence of fiscal conservatism. The Administration has been forced reluctantly to concede the virtue of a balanced budget. Misguided chauvinists are even urging the return to an honest gold standard. Under the latter, a dollar would actually be a specific quantity of gold instead of a vague I.O.U. without maturity.

Nothing is more likely to cramp the style of well-meaning planners than an inability to spend, regardless of revenue, or the use of a dollar which cannot be expanded infinitely. These discredited prejudices of the privileged are likely to place a period on progress.

The fiscal astronomy of Keyserling has a further purpose. During a period of rising food prices, the distress of the housewife trying to accommodate hamburgers and baby sitters within a limited budget created a plausible emergency under which the White House could demand dictatorial powers. Farm prices are now definitely on the skids; the cost of living is coming down, billions of government support loans notwithstanding. The case for controls to check inflation has collapsed.

Another brief is necessary. Like any other agile counsel, the Economic Advisers of the White House have risen to the occasion. An impending $800 billion storm is obviously a major emergency and calls for "adequate controls."

Joseph Stagg Lawrence

Inland Progress

A Progress Report to Its Friends from INLAND STEEL CO., 38 S. Dearborn St., Chicago, Ill.

INLAND TO UP STEEL OUTPUT 17%

50% Increase in Tin Mill Products Expected from Modernized Inland Facilities

Inland Steel Company's capacity for producing tin plate and other tin mill products, now estimated at 17,000 tons per month, will, under the program, be increased to approximately 25,000 tons by replacing existing facilities with more efficient equipment.

To meet the need for additional annealing capacity, a new, continuous annealing furnace, designed to handle 30,000-pound coils, will be installed. In addition, a new tandem temper mill that will operate at a speed of 3,600 feet per minute is to be built.

A new electrolytic tinning line, similar to the one above, will operate at 800 feet per minute and produce 36-inch plate.

Other installations in the planned tin mill improvement program include a new 800-feet-per-minute electrolytic tinning line and a modern high-speed Hallden shear and classifying line.

A view of Inland's No. 2 Open Hearth Department, first to be enlarged and strengthened in the company's modernization program.

SHEET AND STRIP MILL IMPROVEMENTS TO NET 240,000 TONS PER YEAR

With a continuing heavy demand for cold-rolled steel sheets, Inland Steel Company is pushing its program to modernize and increase the capacity of its sheet and strip mills. It is nearing completion and will give the company an increased annual capacity of approximately 240,000 tons of cold-rolled products.

The program includes the addition of new buildings, installation of additional finishing equipment, the modernization of existing equipment, and the regrouping of processing facilities.

OPEN HEARTH MODERNIZATION TO BOOST INGOT CAPACITY TO 4,000,000 TONS

After several years of extensive engineering preparation, Inland has launched a program to increase its annual ingot-producing capacity over the next two years from the present 3,400,000 tons to 4,000,000 tons—a jump of over 17%.

The increase will be accomplished by enlarging and improving existing open hearth facilities. This will not divert large amounts of steel from consumer use, and will increase steel output quicker than would the construction of new furnaces.

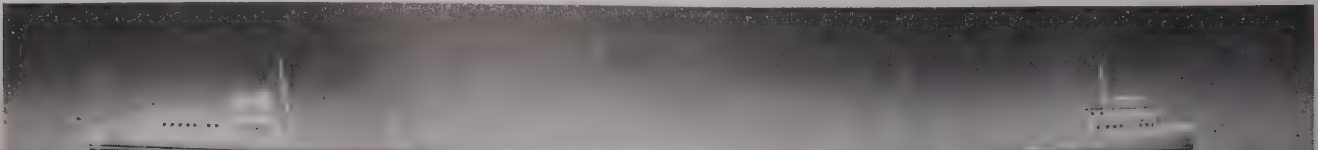
Specific plans in the modernization program involve not only the enlargement of furnaces but also the use of better refractories, expanded use of oxygen for decarburization and flame enrichment, improved charging facilities for all materials, strengthening of the open hearth structures, and installation of heavier equipment, such as cranes and ladles, to handle larger heats. In addition, improved sinter for charge ore, and better-prepared baled scrap will be used.

Inland Installing New Battery of Coke Ovens

A new battery of coke ovens to supply Inland blast furnaces with better fuel is being installed at the Indiana Harbor Plant. Beneficiated coal for the new ovens will come partly from a new coal-washing plant being installed at Inland's Price Mine, Price, Ky.

INLAND ORDERS LARGEST ORE CARRIER ON THE GREAT LAKES

What will be the largest and most up-to-date ore carrier on the Great Lakes is now being built by Inland. The new ship, to be called the "Wilfred Sykes," in honor of Inland's president, will have a capacity of 20,000 gross tons, will be 678 ft. long, 70 ft. wide, and 37 ft. deep, and will travel at 16 m.p.h.



The IRON AGE
March 1, 1949

NEWSFRONT

► Some steel companies are hammering hard at reducing excess inventories of materials which they purchase. The general target is 30 days instead of 60. This includes such supplies as ferroalloys, scrap, aluminum, and in some cases spare parts for machinery which have been carried because of the tight situation.

► It's a good bet that few important labor contracts will be settled before midyear. Smaller companies which succumb to local union pressure and grant wage increases during the next few months before the large contracts set a wage pattern will be running a risk of being left with wage costs that are definitely higher than those of their competitors.

► Britain is changing over one of her older type blast furnaces to pressure top operation. Output is expected to increase from 3500 to 4000 tons per week, or 15 to 20 pct. This will be the first pressure top blast furnace operation in England.

► The nonstandard chemistry extra on alloy steels is about to be dropped. A few of the larger companies have already stopped charging this extra on heat lot orders. It is reported the extra will only be charged in the future on less than heat lot orders.

► Loss of copper production, perhaps the most critical loss at this time, was not the only one chargeable to the long mine shutdown at Bingham Canyon, Utah, due to the recently suspended strike of open pit railroad engineers. There was a nationwide loss of molybdenum concentrates production, down by 40 pct in the fourth quarter, due primarily to the Utah strike. There was also an estimated loss of 50,000 fine oz of gold chargeable to the strike by year end.

► On top of the fact the freight car builders will probably be out of orders by June, large builders in the Midwest now report they will clean up present orders by that time too. Both are heavy users of plates and both industries are covered by government allocations.

► Some small countries, which before the war exported scrap, may never do so again. Reason is that they have developed their own steel industries, mostly by building electric furnaces. They now use the scrap themselves. Also unfavorable state of repair of blast furnaces makes it difficult to reduce consumption of rich ores and scrap.

► Better steel supplies on some items are forcing elimination of prices higher than regular mill quotations. Electrical sheets and wire have been hit. Offerings at lower mill prices have forced the change.

► Some steel buyers are planning to buy their way out of firm conversion steel contracts either because their steel needs look easier or because they are getting better deliveries at standard mill prices. In the switch to a buyers market the sign posts are showing up first among smaller steel consumers. Big firms will pick up the pattern later. Steel companies will be last to feel it.

► If demand and supply level too fast, steel firms will devote close attention to product mix as a way to offset too sharp a leveling in total output. Making more of the less profitable products will cushion the decline--if it becomes a fact.

► Steel companies are taking no chances on a coal strike. Coal stocks are being built up rapidly to protect the high steel rate in case of a mine walkout. If coal stocks continue at current record levels with no change in the soft price trend, coal operators are going to be in a good bargaining position in the event of a strike threat this year.

► Reports show that three out of four automobile dealers are saying regulation "W" is slowing up sales. It is not believed, however, that this regulation will be modified. Many congressmen see regulation "W" standing as a bulwark against inflation and have steadfastly declined to modify this view.

► A chromate-type chemical polish for producing a lustrous, corrosion-resistant surface on copper, brass or bronze surfaces has been introduced by an eastern firm. The new polish is said to be non-fuming and non-critical during operation and material being polished does not become etched, even from long immersion.

► Manufacturers of some items such as ammunition and guns are going after distributors to find out when new quota orders are to be sent in. Many of the distributors are playing coy and saying that it won't be long now, but they aren't doing anything about it. Inventories are being pared down, old stock is being sold at slightly above costs and a general housecleaning is underway.

. . . Heat Treatment of

By R. E. SPEAR and L. J. EBERT

Research Assistant and Senior Research Associate, respectively, Metals Research Laboratory,
Case Institute of Technology,
Cleveland

EACH of the chief alloying elements in aluminum alloys forms a similar type of equilibrium diagram. Fig. 1 shows a typical two-component system which is responsible for the heat-treating effects of aluminum alloys; the two factors which are of major significance are the increasing solid solubility of the alloying element in aluminum with increasing temperature (line *EF*) and the presence of a two-phase field with one hard constituent (field $\alpha + B$), adjacent to the solid solubility line.

The heat treatment of aluminum alloys is based upon the formation and retention of the solid solution (α) and/or the controlled precipitation (precipitation hardening; age hardening) of the hard, brittle phase *B*. Five general types of heat treatments given to aluminum alloy castings are: (1) solution heat treated, (2) aged, (3) solution heat treated and aged, (4) annealed or stabilized, and (5) solution heat treated and stabilized.

Solution heat treatment consists primarily of the formation of solid solution. A casting of composition X, fig. 1, in equilibrium at room temperature, would be composed of the two phases α and B, where α is a solid solution of *B* in *A*, while *B* may be either a single element (or compound) or a solid solution of *A* in *B*. Since the maximum amount of solid solution is formed at the eutectic temperature FHI, the ideal solution temperature would be just below the eutectic temperature. This is not possible commercially, however, because of the segregation of low melting constituents in the

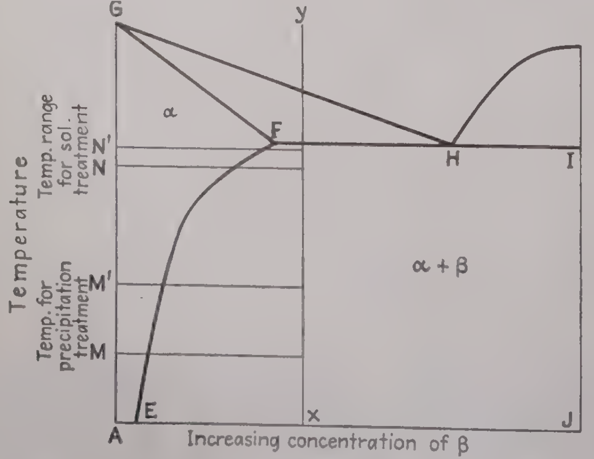

G
y
α
F
N'
N
H
I
Temperature
Temp. range for sol. treatment
Temp. for precipitation treatment
M'
M
α + β
E
A
x
J
Increasing concentration of β

FIG. 1—Typical binary equilibrium diagram for aluminum and each of its major alloying elements. M-M' represents temperature range for precipitation treatment, and M-N' represents temperature range for solution treatment.[1]

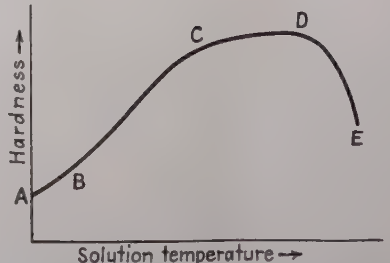


FIG. 2—Typical effect of solution heat treating temperature on hardness of aluminum alloys.

Aluminum Casting Alloys

Aluminum casting alloys possess physical properties that can be extended, by proper alloy application and suitable heat treatment, to embrace a wide variety of applications. A correlated, comprehensive literature study covering four alloy types is reported by the authors. Emphasis is placed on the aluminum-copper alloys, in this first part of a two-part article, and data are presented indicating the the influence of various heat treating variables on the physical properties of these alloys.

cast structure. The most workable solution temperature range is one that will form the largest amount of solid solution and at the same time will not allow melting (incipient fusion). To accomplish this, a temperature range similar to that shown in the figure is generally acceptable.

The change in hardness, with solution temperature is shown schematically in fig. 2. Hardness increases with temperature up to the temperature of incipient melting; when melting begins the hardness falls sharply. The portion of the curve from *A* to *C* represents the forming of solid solution up to the knee in line *EF* of fig. 1. Because the line *EF* in fig. 1 is quite steep for low temperatures there is little solution effect for low solution temperatures (*AB* in fig. 2).

The portion of the curve *CD* in fig. 2 represents the formation of solid solution in the solution heat treating range shown in the first figure. The drop in hardness (*DE* of fig. 2) is the result of melting; therefore, the temperature range which is the most satisfactory is that just to the left of the peak hardness *D* shown in fig. 2.

For any given solution heat-treating temperature there is an effect of time at temperature. The time of solution treatment controls two reactions; (1) forming of the solid solution, and (2) spheroidizing of the microconstituents which do not go into solution.

The time of solution treatment is composed of four periods. The first period, *AB* in fig. 2, is usually small and is the time required to start

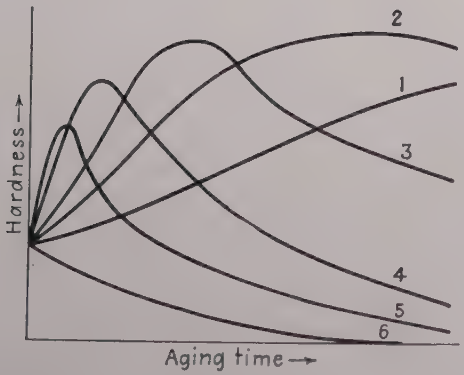


FIG. 3—Typical age-hardening curves; increasing numbers indicate increasing temperatures.[3]

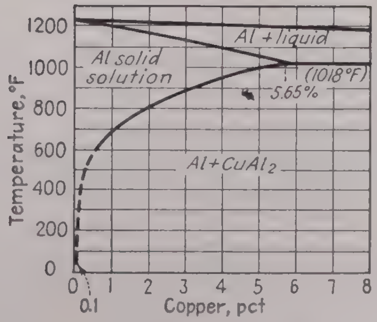
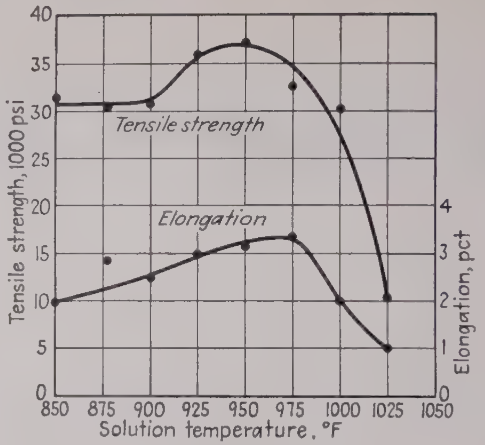


FIG. 4—System Al-Cu; detail of aluminum end of the equilibrium diagram showing the solid solubility of copper in aluminum.[4]



ABOVE

FIG. 6—Effect of solution heat treating temperature on tensile properties of a 4.5 pct Cu-Al alloy. Alloy contains 4.6 Cu, 0.1 Mg, 0.45 Si, 0.6 Fe and 0.11 Mn. Alloy sand cast; solution treated for 96 hr; aged at 300°F. for 8 hr.[6]

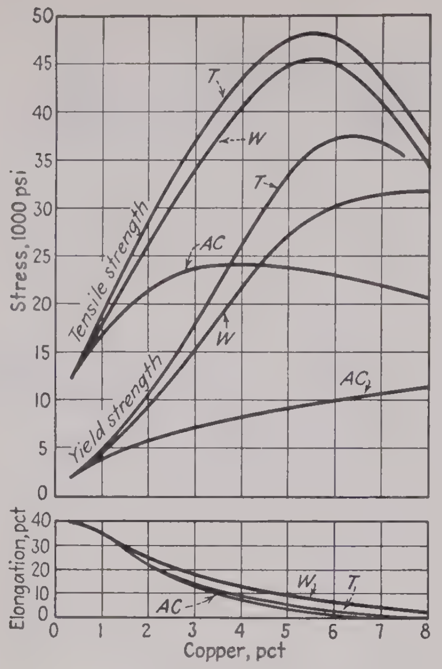


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FIG. 5—Effect of copper on tensile properties of sand-cast, high purity Cu-Al alloys in the as-cast (AC), solution heat-treated (W), and solution heat-treated and aged (T) conditions.[5]

the reaction of solution. The second period *BC* is the time in which the solution is carried almost to completion. During the third period *CD* the solution reaction is completed and the spheroidizing reaction begins to show effects. In the fourth period *DE* the spheroidizing of the constituents which will not go into solution is the controlling factor, and since spheroidizing tends to soften the alloy, the curve starts to drop when this period is reached. For practical reasons the solution time usually chosen is slightly to the right of *C*.

Having established the desired degree of solid solution the alloy must be quenched rapidly to maintain the high solution at room temperature. The more rapid the quench the more thorough the retention of solid solution. The quenching operation is inclined to set up stresses in the casting, however, which may cause warpage—especially true for complicated castings having abrupt changes in section thickness — and in order to eliminate warpage, concessions must be made to the retention of solid solution by reducing rate of quench. Quenching into boiling water is one of the most effective means of cooling commercial castings.

A number of other factors, in addition to time and temperature, which must be mentioned in a discussion of solution heat treatment, are; grain size of casting, size of casting, type of furnace, manner of packing furnace, and alloy composition. All of these factors are interdependent, but in order to consider them individually the assumption must be made that the other factors remain constant.

Grain size of the casting affects the solution heat treatment by its influence on the diffusion rate and surface area of alloy constituents supplied for reaction. A small-grained casting may be heat treated at a lower temperature, or preferably for a shorter time at the same temperature, than one containing large grains. For this reason a chill-cast piece is solution heat treated for less times than a sand-cast piece of comparable dimensions.

Size of the casting is effective on two accounts, thermal transfer and grain size. All other things being equal, the larger the casting, the larger are the center grains and thus the longer is the time required for solution treatment. Since transfer of heat through a large piece is slower than that through a small piece, the length of time to solution heat treat a large section is greater as compared to that for a small section.

The type of furnace employed will determine the effectiveness of heat treatment in that it controls the heat available for the casting. Air-chamber furnaces are most widely used for heat treatment of aluminum castings. The temperature of a properly designed furnace can be controlled ±5°F in the working zone. It is desirable that the air be mechanically circulated and held to the desired temperature by the use of baffles on the heat source side. Furnaces may have as a source of heat, resistance coils or radiant tubes. In some cases, gas furnaces, in which the products of combustion are circulated, are used if the products of combustion are free of sulfur compounds and excess moisture and if there is a high percentage of carbon dioxide in the gases.

Salt pots are also used for the heat treatment of aluminum castings. In this case the temperature control requirements are again ±5°F. Care is exercised to assure that pitting of the surface is minimized by the proper use of inhibitors in the salt.

The manner of packing a furnace influences the heat treatment both as to temperature and time. Placing the castings in such positions that free circulation of air is permitted around all pieces, keeps the time required for heat treatment to a minimum. In addition, the castings should be so arranged that the highest possible temperature may be attained without warping the castings due to poor high temperature properties.

Effect of alloy composition upon heat-treating practices is the prime object of this article and will be subsequently discussed.

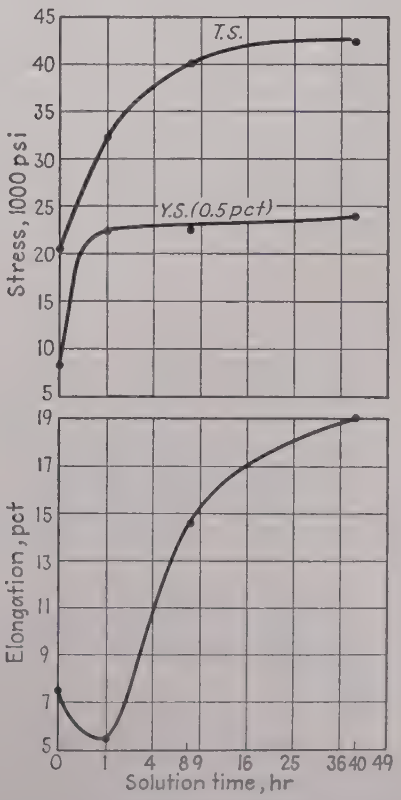
At this point it should be mentioned that alloys in the as-cast condition generally contain a certain amount of supersaturated solid solution. This unstable phase is produced by the comparatively fast cooling of the casting from the molten condition in commercial practice — the faster the cooling the greater is the solution effect. The retention of some supersaturated solid solution explains the ability of castings to age in the as-cast condition.

Precipitation hardening (aging) is the second phase of heat treating to be considered. The phenomenon of aging is based upon the decomposition of the supersaturated solid solution. The phase in solution (*B* in fig. 1) exists under (unstable) inequilibrium conditions, and upon the application of heat (or in many cases at room temperature) the *B* phase tends to return to its equilibrium condition, i.e., to come out of solution. In doing so, it usually precipitates in finely divided (microscopic) form along the crystallographic slip planes, resulting in an increase in the resistance of the alloy to deform plastically, or an increase in hardness. The requirements for such a reaction are a decrease in solubility with a decrease in temperature, and a precipitated phase that is hard enough to resist slip.

Extensive work by Fink and Smith[2] on the theory of aging indicates that: (1) "In both aluminum-copper and aluminum-magnesium alloys, precipitation can be observed microscopically before the aging has progressed far enough to change the yield strength and elongation substantially. (2) In both the aluminum-copper and aluminum-magnesium systems, the phase that precipitates during the aging at low temperatures is different from the phase that precipitates at elevated temperatures. (3) There now seems to be no justification for modification or complication of the theory of precipitation hardening originally advanced by Merica, Waltenberg, and Scott."

Schematic aging curves for time v. hardness are shown in fig. 3. The increasing curve numbers indicate increasing temperatures of aging. Thus, aging at room temperature would result in a change in hardness comparable to curve 1, while aging at a high temperature would be similar to curve 6.

The reason for the reversal of slope of the intermediate temperatures is explained by the



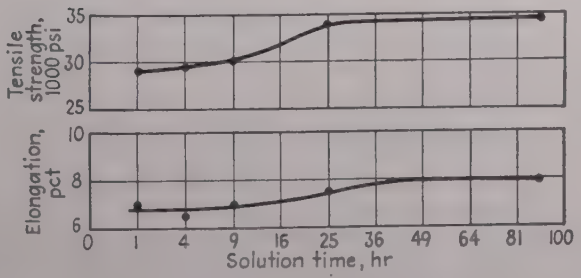
RIGHT

FIG. 8—Effect of solution heat treating time on tensile properties of sand-cast alloy 195 (4.5 Cu). Alloy solution treated at 1000°F and aged at room temperature for 2 days.[7]

o o o

BELOW

FIG. 7—Effect of solution heat treating time on properties of a 4.5 pct Cu-Al alloy. Alloy contains 4.4 Cu, 0.2 Mg, 0.5 Si and 0.95 Fe. Alloy sand cast; solution treated at 920°F; aged at 300°F for 2 hr.[6]



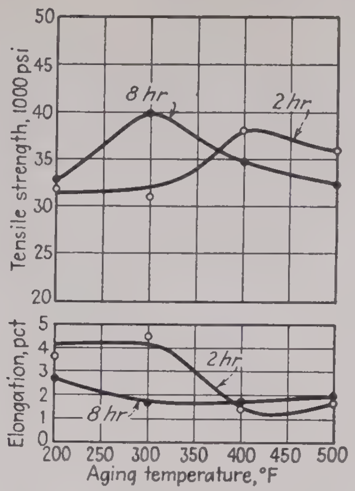


FIG. 9—Effect of aging temperature and time upon tensile properties of a sand-cast 4.5 pct Cu-Al alloy. Nominal composition; 4.5 Cu, 0.2 Mg. Alloy solution treated at 925°F for 144 hr.[6]

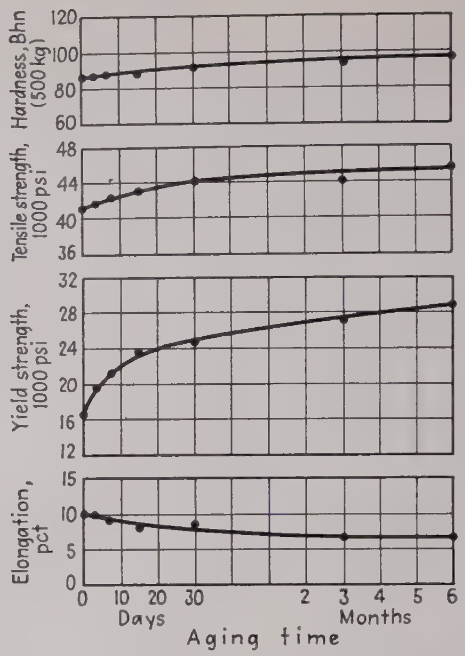


FIG. 10—Effect of room temperature aging on properties of permanent mold alloy B195. Alloy solution heat treated and aged at room temperature.[1]

fact that a critical size of precipitated particle exists. As the particles grow to the critical size, the hardness increases, but once the critical size has been passed, the hardness drops, and the metal is said to be overaged. At high aging temperatures it will be noted that the alloy becomes softer immediately while at room temperature, overaging does not exist in any reasonable length of time, if at all.

Fig. 3 also shows that as the temperature of aging increases, the peak hardness is reached in shorter times, but the peaks of the short-time, high-temperature treatments are lower than those of the long-time, low-temperature treatments.

Annealing (or stabilizing) is carried out at a relatively high aging temperature. The object of such a treatment is relief of the stresses set up in casting and the overaging of the alloy so that no thermal growth and/or precipitation will take place in high temperature operation.

The stabilizing treatment may be conducted from the as-cast condition, or from the solution heat-treated condition, the same as discussed before.

Four alloy types which are considered in this article, are: aluminum-copper, aluminum-silicon, aluminum-magnesium, and aluminum-silicon-magnesium.

Aluminum-Copper Alloys

The equilibrium diagram in fig. 4 shows that the maximum solid solubility of copper in aluminum is 5.65 pct at 1018°F. At room temperature the solubility is reduced to 0.1 percent copper. The phase which would be expected to precipitate from a solution heat treated condition is $CuAl_2$.

The effect of copper upon the tensile properties of aluminum in the as-cast, solution heat-treated, and solution heat-treated and aged conditions, are shown in fig. 5. For the unheat-treated condition, the yield strength increases and the elongation decreases almost linearly with increased copper content (up to 8 pct), while tensile strength, exhibits a maximum at about 3.5 pct Cu.

As would be expected from a consideration of the maximum solid solubility, the optimum tensile and yield strengths of the heat-treated conditions occur between 5 and 6 pct Cu. A comparison of the as-cast and the solution heat-treated conditions clearly shows the strength imparted by the solid solution treatment. The yield and tensile strengths are increased further by precipitation hardening.

The elongation in fig. 5 is decreased by additions of copper. For a given copper content, the solution heat treatment raises the elongation con-

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[1] *H. J. Rowe and W. E. Sicha, "Cast Aluminum Alloys Heat Treatment," American Foundryman, vol.* 10, *August* 1946, *p.* 30.

[2] *W. L. Fink and D. W. Smith, "Age-Hardening of Aluminum Alloys," IV-Discussion of the Theory, Metals Tech., vol.* 6, 1939, *TP* 1083.

[3] *L. W. Kempf, "A Description of the Age-Hardening Process as Applied to Castings," Trans., AFA, vol.* 46, 1938, *p.* 19.

[4] *L. F. Mondolfo, "Metallography of Aluminum Alloys," John Wiley and Sons, New York,* 1943, *p.* 104.

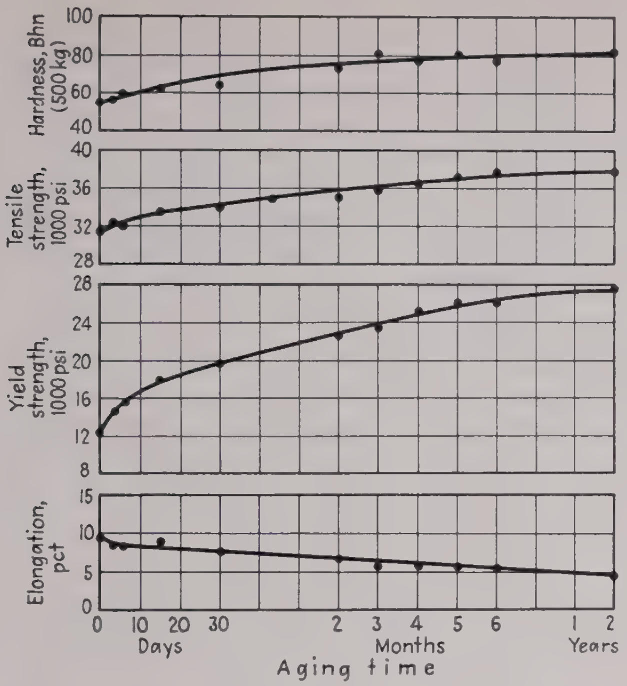

FIG. 11—Effect of room temperature aging on properties of sand-cast alloy 195. Alloy solution heat treated and aged at room temperature.[1]

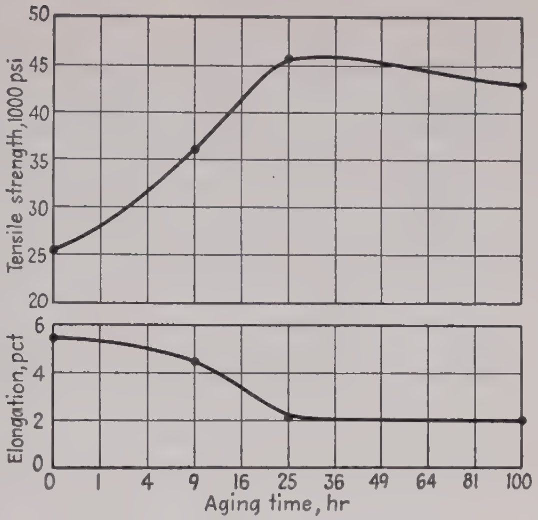

FIG. 12—Effect of aging time on tensile properties of sand-cast 4.5 pct Cu-Al alloy. Nominal composition; 4.6 Cu, 0.22 Mg, 0.5 Si, 0.95 Fe. Alloy solution heat treated at 925°F for 96 hr and aged at 300°F.[6]

siderably, but the precipitation treatment reduces it to nearly its value for the as-cast condition.

4.5 Pct Cu Alloy—The effect of solution heat-treating temperature on this alloy is shown in fig. 6. Since the time of solution treatment was 96 hr, the values given have little commercial significance. However, the temperature of maximum tensile strength and elongation should not be greatly affected by the long-time treatment. The optimum tensile properties occur at about 950°F. Overheating causes an immediate drop in properties because of incipient melting.

The magnesium content of the low-copper aluminum alloys is of importance to solution heat treating. For example, increasing magnesium contents from 0.1 to 1.0 pct, (of a 3 pct Cu alloy) reduces the optimum solution heat-treating temperature from 1125° to 1060°F, respectively. In other words, as the magnesium content increases the temperature at which incipient melting occurs decreases, because of the formation of a low melting ternary phase.

The effect of solution heat-treating time is shown in figs. 7 and 8. The temperature of solution treatment in fig. 7 was 920°F, while that of fig. 8 was 1000°F. Although different alloy compositions are represented in the two figures, both show significant increases in properties with time, up to about 25 hr, after which the increase in properties is only slight.

The aging of this type of alloy has been reported for both room temperature and elevated temperatures. The effect of aging temperature is shown in fig. 9, where two aging times are represented for temperatures from 200° to 500°F. The specimens were aged from a solution heat treatment of 925°F for 144 hr. The curves follow the theory that high temperatures reach optimum properties sooner than low temperatures, but the tensile strength is greater for the low temperature long-time aging treatment.

Figs. 10 and 11 show the effect of room temperature aging time, from a solution heat-treated condition, on the tensile properties and hardness. Fig. 10 shows the change in properties of a chill-cast alloy, while fig. 11 shows the change for a sand-cast alloy. The faster response of the chill-cast alloy agrees with the theory explained earlier. The trend of the properties rises continuously, showing that no overaging takes place. As would be expected, the major aging effect in both cases occurs in the first month.

The effect of aging time at 300°F from a solution heat treatment of 925°F for 96 hr, is shown in fig. 12. Maximum tensile strength is reached after 25 hr at 300°F; further aging produces

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[5] *L. W. Kempf, "The application of Solid Solution and Precipitation Hardening Effects in Aluminum Alloys," Age-Hardening of Metals, ASM,* 1940, *p.* 8.

[6] *Daniels, Lyon and Johnson, "Casting and Heat Treatment of Some Aluminum-Copper-Magnesium Alloys," Trans. AIME,* 1924.

[7] *R. S. Archer and Z. Jeffries, "Aluminum Castings of High Strength," AIME, vol.* 75, 1927, *p.* 35.

[8] *S. D. Daniels, "Effect of Reheating on the Aluminum-Copper-Nickel-Magnesium and Aluminum-Copper-Iron-Magnesium Alloys," AIME, vol.* 73, 1925, *p.* 479.

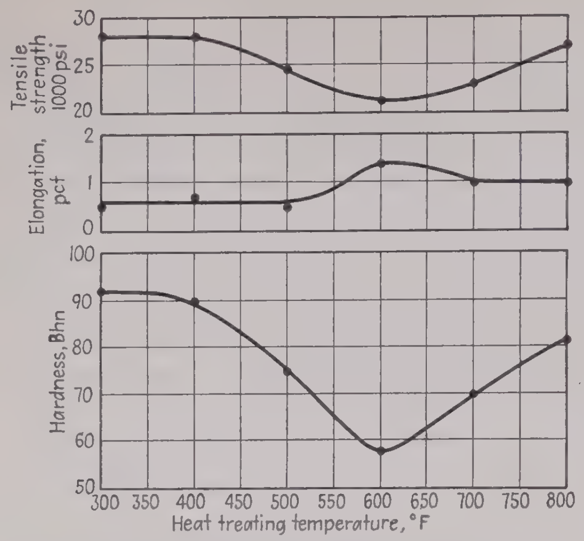


FIG. 13—Effect of heat treating on physical properties of an alloy containing 4.13 Cu, 1.79 Ni, 0.58 Fe, 1.38 Mg. and 0.24 Si. Time at temperature 25 hr; followed by air cool.[8]

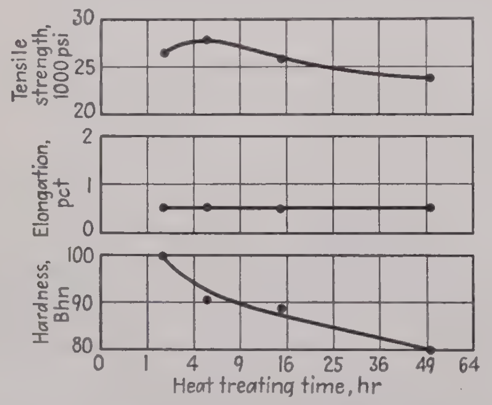


FIG. 14—Effect of stabilization time on properties of sand-cast aluminum alloy with same composition as that in fig. 13. Heat treating temperature of as-cast alloy 500°F.[8]

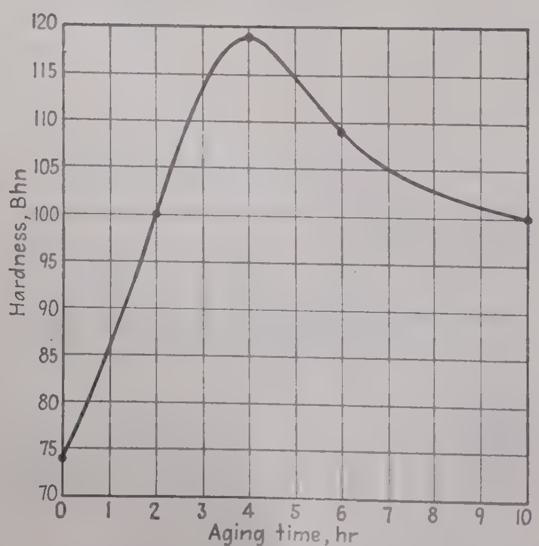


FIG. 15—Effect of aging time on hardness of a chill-cast 8 pct Cu-Al alloy. Alloy solution heat treated at 1000°F for 3 hr, and aged at 340°F.[9]

a slight decrease in tensile strength but no change in elongation.

Another alloy of the 4.5 pct Cu type is that commonly known as "Y" or 142 alloy. This alloy contains appreciable amounts of magnesium and has properties similar to the 10 pct Cu alloy (to be discussed later). Fig. 13 shows the change in tensile properties and hardness for different heat treating temperatures. All specimens were air cooled so that no appreciable supersaturated solid solution was present. Therefore, the lower temperatures might be considered an aging treatment, while the high temperatures are a stabilization treatment.

Fig. 14 shows the effect on the same alloy of aging time at 500°F. Little change in tensile strength takes place up to 5 hr, at which time a slight decrease in strength occurs, indicating an overage condition. The small elongations make measurements very insensitive, but the hardness decrease with increasing time, shows also that overaging is taking place.

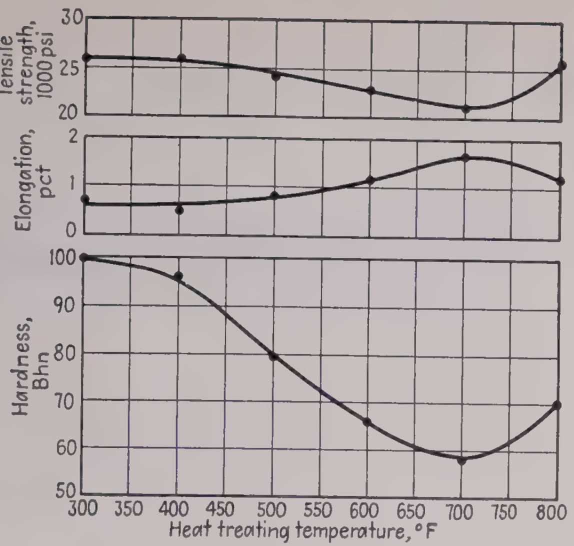
8 Pct Cu Alloy—The only data available on this alloy is that shown in fig. 15, which shows the effect of aging time on hardness, at 340°F, after a solution heat treatment of 1000°F for 3 hr. It is seen that the maximum hardness is reached at 4 hr. The overaged portion of the curve has a slope about one-half as steep as the underaged portion.

10 Pct Cu Alloy—Alloys of this type are of interest primarily because of their high temperature applications. Because of this use, the heat treatments applied must eliminate thermal growth. As discussed earlier, the heat treatment used to eliminate thermal growth is in the range of overaging. Fig. 16 shows the effect of various heat-treating temperatures on the tensile properties and hardness of specimens held at temperature for 25 hr and air cooled.

The temperatures reported in the figure range from what is normally an aging treatment to a low temperature solution treatment. Since the air-cooled quench used for all specimens would not allow a retention of an appreciable amount of supersaturated solid solution, the higher temperatures shown actually represent stabilizing treatments. No data were found in the literature on the effect of solution heat treatment.

The effect of aging from the as-cast condition is shown in fig. 17. The curves follow the theoretical aging curves discussed earlier, but even at the comparatively high aging temperature of 365°F, overaging does not take place until after about 10 hr. Since this alloy must not grow thermally in most commercial applications, it is necessary to be on the overaged side of the curve. The implication from the figure is that this can be done at temperatures up to 365°F only by use of long times. The trend of the curves shows that higher temperatures will, however, shorten the times required.

The above statements are substantiated by the data shown in the curves of fig. 18. The values reported are for various aging times at a temperature of 500°F. Even at 4 hr, the tensile



ABOVE

FIG. 16—Effect of heat treating temperature on properties of sand-cast alloy, containing 9.66 Cu, 1.38 Fe, 0.28 Mg and 0.40 Si. Heat treating time (from as-cast condition) 25 hr.[10]

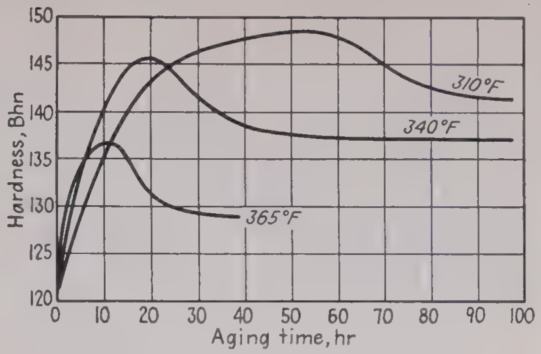


FIG. 17—Effect of aging time and temperature on hardness of an aluminum alloy containing 10 pct Cu. Alloy aged from as-cast condition.[3]

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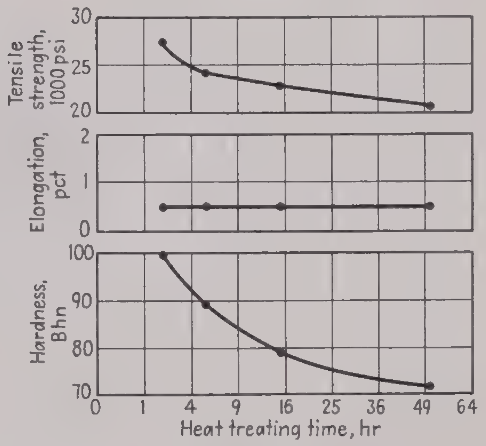


RIGHT

FIG. 18—Effect of stabilization time on the properties of a sand-cast alloy with same analysis as in fig. 16. Heat treating temperature (from as-cast condition) 500°F.[8]

strength and hardness have a downward trend, which implies that the alloy has been overaged.

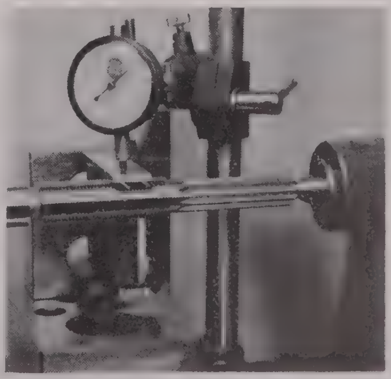
The data presented are not specific enough to establish a definite aging heat treatment from the as-cast condition for the 10 pct Cu alloy; however, no additional data were found for the aging from either the as-cast or solution heat-treated conditions.

In a subsequent issue, the authors will consider the effect of heat treatment on physical properties of the aluminum-silicon, aluminum-magnesium and aluminum-silicon-magnesium alloys.—Ed.

Checking Thread Pitch Diameter Runout

A SIMPLE but quite effective method of checking pitch diameter runout of threaded shafts has been devised by E. P. McKitrick, chief inspector of Cross Co., Detroit. The accompanying illustration shows the arrangement of the standard gages used in this quick and accurate checking method.

As the spindle holding the threaded shaft is revolved, the wires follow the lead of the thread and hold their longitudinal position against the face of the planer gage. When taking indicator readings, the best results are obtained by reversing the rotation of the spindle slightly every third of a turn. This action draws the wires away from the gage and permits them to nest in the threaded section without interference.



GAGE blocks, centers and a dial indicator are the major components of this simple device for checking PD runout of threaded shafts.

Getting the Most Out of Friction-Type

◦ ◦ ◦

By H. L. SMITH

Executive Technical Engineer,
Federated Metals Div.,
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Pittsburgh

◦ ◦ ◦

FRICTION-TYPE bearings in use today can be divided into two classes. One includes the bearings generally used in old machinery which might be called the nonprecision type; the second class encompasses the precision type bearings generally used in new equipment.

Nonprecision bearings are for the most part heavy, oversized and thick-lined. Usually they are not made by bearing manufacturers. Precision bearings, on the other hand, are carefully engineered and fabricated to specific requirements.

When investigating a bearing problem, any solution must take into account the economics involved. While a great deal of heavy machinery in use today might well be considered old equipment, it would be costly, if not impossible, to replace the old bearings in these machines with new precision bearings.

Through systematic study, however, the older bearing types can be made to give longer trouble-free service. By choosing a bearing alloy with the proper physical characteristics for the job at hand, fabricating the bearing properly according to fundamental principles of good foundry practice and by following accepted methods of lubrication, it is possible to lengthen service appreciably.

The following suggestions are offered the users of nonprecision bearings in the interest of averting many time-consuming troubles:

(1) When a bearing is made, segregation within the lining metal should be reduced to a minimum and, upon cooling, directional solidification should be controlled in order to eliminate shrinkage cracks which would prevent the babbitt from resting tightly against the shell.

(2) In those bearings which have an excessively thick layer of babbitt metal the shell should be built up to a point where the babbitt layer will be as thin as design and service requirements permit.

(3) An accurate determination of the proper clearance between bearing and shaft must be made.

As an example, if a steel shell were lined with lead base babbitt ½ in. thick, or more, the babbitt might expand more than the steel and thus produce an expansion that would in turn reduce the inside dimension of such a bearing, causing seizure. To overcome this, many maintenance men increase clearance beyond the proper limit, and do this, as in fig. 1, to such an extent that line contact is encountered between the journal and the bearing lining.

In this case the journal must seat itself in the bearing metal during the early stage of operation, the break-in period. In such bearings there must be a direct relation between the hardness and other physical characteristics of the bearing alloy, the temperature generated in the first few minutes of operation, and the ability of the bearing to radiate and dissipate heat.

A time-temperature curve of certain line contact or self-seating bearings reveals that many bearing failures are caused by a very rapid and excessive rise in temperature as the shaft seats itself in the bearing metal during the first minute of operation. The time-temperature curve, fig. 2, should rise steadily until the shaft forms

Bearings • • •

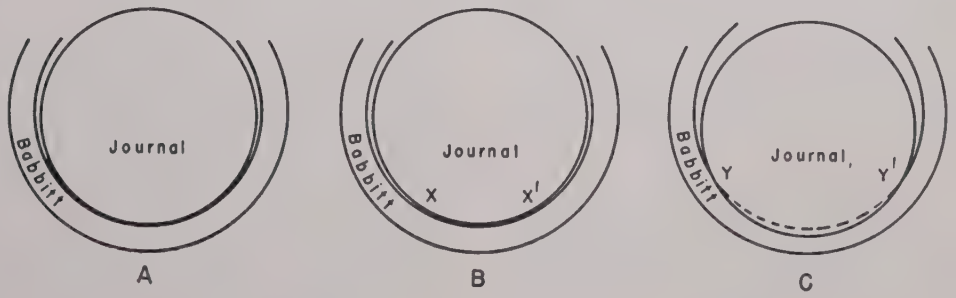
Advice on oil groove location, surface finish, babbitt layer thickness, clearance and other variables affecting the life and service of both nonprecision and precision bearings is given by the author. The effect of inertia load on precision bearing design and testing is discussed, and the load carrying abilities of the precision bearing alloys are summarized.

an area in the bearing alloy sufficient to support the load with adequate lubrication. At this time the curve should approximate a horizontal straight line at the desired operating temperature.

Lubrication of such bearings is usually accomplished by the aid of oil grooves. A common question asked in such practice is "Where should oil grooves be located with respect to the load zone?"

Grooves should be located in the unloaded area of the bearing and so placed that they direct the lubrication towards the center just ahead of the load. The only grooves that should ever be in the loaded area of a bearing are oil retainer grooves, usually found at each end. Radial oil grooves are desired by most bearing manufacturers together with what might be called spreader grooves to carry and feed the oil towards the center ahead of the load.

Grooves which tend to feed the lubricant to-

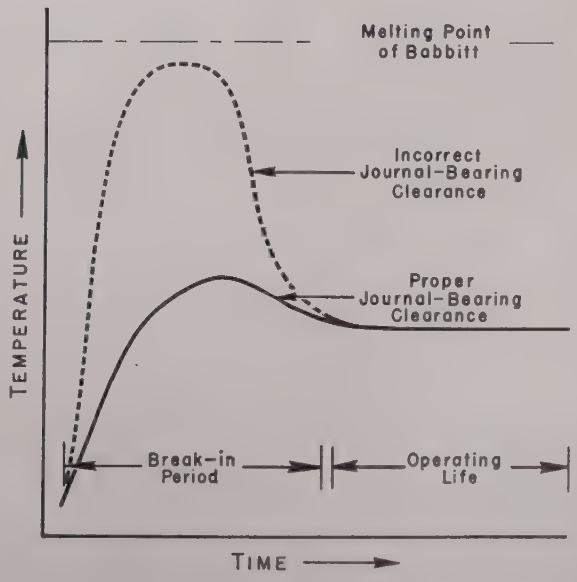


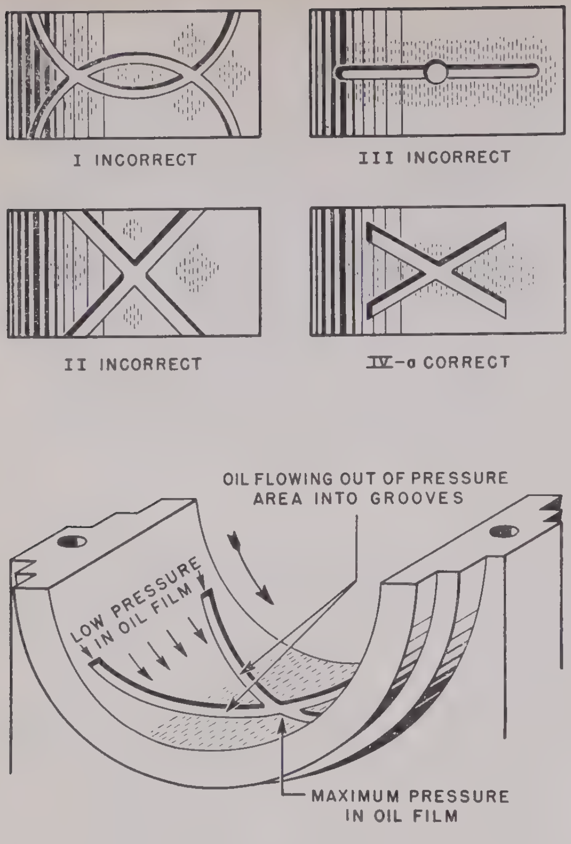
ABOVE

FIG. 1—Proper clearance in a bearing, where there is maximum contact between the journal and the lining, is indicated in sketch *A*. Incorrect clearance, as in *B*, results in line contact indicated by *XX'*. Sketch C shows how a properly-fitted bearing seats itself, resulting in increased contact area and lower unit area pressure.

RIGHT

FIG. 2—Time-temperature curves of line contact or self-seating bearings reveal shortcomings in design. Where improper clearance exists, as indicated in sketch *B* of fig. 1, rapid and excessive rise in temperature, as the shaft seats itself in the bearing metal during the first minute of operation, may lead to failure.




I INCORRECT

III INCORRECT

II INCORRECT

IV-a CORRECT

OIL FLOWING OUT OF PRESSURE AREA INTO GROOVES
LOW PRESSURE IN OIL FILM
MAXIMUM PRESSURE IN OIL FILM

IV-b

FIG. 3—Three incorrect types and one correct type of oil grooves. Types I and II are not desirable since oil will be forced out of the bearing. Type III is impractical because the edges will act as scrapers and keep oil out of the load area. Types IV-a and IV-b show proper grooving wherein oil is directed from the low to high pressure areas. Note that X-grooves do not extend to edge of bearing.

wards the ends of the bearing do not prolong bearing life. This type of groove is exemplified by the old type X-groove. Shaft pressure will press the oil towards the end of the bearing without X-groove assistance. A groove in the loaded area of the bearing is not recommended because in that position a groove acts as a scraper of the lubricant instead of a distributor. Sketches of these groove types are shown in fig. 3.

For two-piece bearings, which are usually designated as top-half and bottom-half where shims are used, the shim should be filed or machined to fit the contour of the bearing grooves. If extension beyond the groove toward the journal is permitted, the shim will act as a scraper and retard the flow of lubricant when it reaches the side grooves or pockets intended for oil feeding.

TABLE I

General Characteristics and Abilities of Precision Bearing Alloys

Alloy Type	Approximate Maximum Load, psi	Conformability	Corrosion Resistance	Bondability
Tin base babbitt	2000	excellent	excellent	excellent
Lead base babbitt	2000	excellent	good	good
Aluminum alloy	3500	low	excellent	low
Cadmium-nickel babbitt	2500	good	low	excellent
High lead bronze	1500	low	fair	good
Tin bronze	1800	low	fair	good
Cast iron	500	low	low	low

The point of oil entry has a very definite relationship to bearing life. Loads may vary as to their position; that is, one bearing may have the load on top, while another may have the load on an angle. Since the best practice is always to enter the oil just ahead of the load, it is advisable to determine the location of the load by inspecting the bearing before removing the old babbitt.

Oil retainer grooves are, as a rule, not used unless there is excessive squeezing out of the lubricant at the ends of the bearing. However, if there is excessive squeezing out of the oil, then oil retainer grooves, feathered toward the center of the bearing, should be used.

Surface finish is particularly important. Most bearing manufacturers desire a smooth bore finish, but the bearing surface should be precisely parallel with the shaft at all times and any tool marks which may appear should likewise be parallel with the shaft as in fig. 4. Tool marks should never follow the circumference of the bearing, as such marks may cause minute scratches on the journal which subsequently can develop into large cracks and cause the journal to break.

Turning to precision type bearings, it is found that there has been a rather unique transition in development of this type from the old nonprecision bearings. The change is associated with the length-to-diameter ratio.

In a majority of nonprecision bearings most engineering references advise that the length of the bearing should be two to three times the diameter and sometimes even greater. However, where steps have been taken to apply certain fundamental bearing principles, good bearing operation is obtained by reducing the length of the bearing to 1 or 1½ times the diameter. In modern equipment, where precision bearings are used, the ratio of length is still further reduced to about ¾ or less, of the diameter.

It can be said that the lower the ratio of length to diameter, the greater is the degree of precision required, not only in the making and installing of bearings but also in evaluating service requirements.

For example, in certain internal combustion engines where the outside load is small in comparison with the inertia load, the bearings withstand the maximum load for which the unit is designed at the maximum operating speed. The same bearings, however, can be made to fail by eliminating all outside loading and just increasing the rpm by about 10 pct beyond the maximum specified. Such an increase in rpm produces high inertia load, which is defined as the load encountered when the piston changes its direction from an upward to a downward motion. In fact, a test exists in which the speed of certain engines designed to operate at 3600 rpm is increased to 4000 rpm, thus increasing the inertia load safely beyond any actual operating load encountered under normal operating conditions.

Bearings should be designed to operate safely within the true maximum load-carrying capacity required of them. For nonprecision bearings the length-to-diameter ratio usually absorbs any safety factor that is necessary, because, when the older type bearings failed, their size was merely increased until no further failure occurred, whether it was due to shock loads, intermittent stop-start operations or some other cause.

If higher loads or special services are required from precision type bearings, these are obtained not by increasing the size of bearing but by proper selection of the bearing alloy or combination of alloys. Conformability, corrosion resistance, bondability and other properties aside from load-carrying capacity must be weighed. These properties and abilities, for the commonly-used alloys, are indicated in table I. The values are for precision bearings. For the ordinary type, loads about 50 pct of those tabulated are normal.

Corrosion is probably the most intriguing of all bearing problems because it is the least controllable. The lead base bearing alloys, which possess high resistance to fatigue and also retain their hardness at elevated temperatures and over a prolonged period of time, have shown their superiority in this respect in internal combustion and diesel engines where the manufacturer has some control over the type of oil used.

In other equipment, such as electric motors, where there is no control of lubrication and where abnormal service conditions may be encountered, it is sometimes best to use an alloy similar to the high tin SAE 14 mixture. It is known that SAE 14 does not maintain its properties or resist fatigue as well as some of the lower tin alloys, but it does have a safety corrosion factor which compensates for the lowering in physical values.

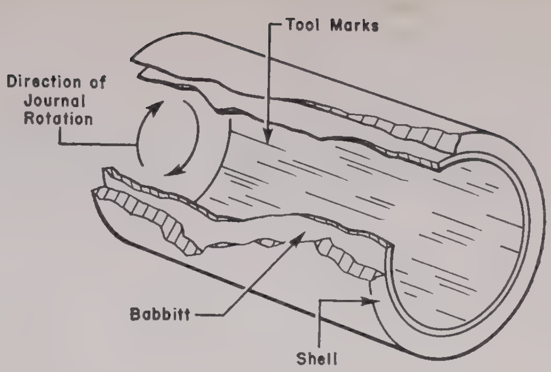


FIG. 4—Tool marks should be at right angles to the direction of shaft rotation, as shown here. If the marks are parallel, shaft highspots may fall into tool grooves and cause trouble through rutting action. If at right angles, the rotating shaft will tend to smooth out bearing irregularities.

The universal bearing alloy has not yet been developed and the maintenance engineer, as well as the bearing designer, must weigh service requirements carefully against the physical characteristics of the various types of bearings and alloys if best results are to be obtained.

German Aluminum Clad Mills Resume Production

ALUMINUM-CLAD strip steel, known as "Feral," was popular in prewar Germany, the production of three factories in which it was made totaling to about 500 tons per month. This material is again being produced and coming back into use, according to the British publication, *Light Metals.* In the February, 1949, issue, the magazine points out that it is being used for the manufacture of flexible tubing, telephone diaphragms, electric cable protection, and similar items. The steel backing is a hot rolled strip steel, the composition being 0.06 pct C, 0.04 pct S, 0.04 pct P, 0.6 pct Mn, with traces of Si.

The aluminum strips for coating are about 6 in. wide and ¼ in. thick, and containing from 0.6 to 1.0 pct Si and 0.35 pct Fe. These are cold rolled to a thickness of 0.0078 in., cut to the desired width, annealed in coils and then wound onto the reels of a special mounting on the cladding mill, over and under the steel strip to be clad.

The steel is supplied in hot rolled form, 6 in. wide x 0.1377 in. thick. It is cleaned either with cold hydrochloric acid or hot sulphuric, washed in cold water and then dipped in warm chalk water. Dried and cut to width, the strip is leveled and passed directly to a brushing machine in which circular brushes and rollers roughen both sides of the strip. These brushes are made of high carbon steel wire, but phosphor bronze wire brushes are also employed.

After roughening the surfaces by the brushing action, the steel is passed to the cladding mill reel. Small guide rolls keep the aluminum in place and a tension is maintained to provide mechanical adherence of the aluminum to the steel as it passes through the mill rolls. A minimum reduction in thickness of the strip takes place during this cladding process. The aluminum-steel-aluminum sandwich is cold rolled, the temperature for adhesion being produced and maintained by the rolling operation.

After passing through the cladding mill, the strip of clad metal is wound onto a drum at high tension and annealed at a temperature between 995 and 1025°F for 10 to 15 hr. Time and temperature are factors affecting the flexibility of the strip and the formation of $FeAl_3$ at the interface between the metals.

Speeds and Feeds To Use

By E. W. WOLFF
Abrasive Engineer,
Simonds Abrasive Co.,
Philadelphia

TABLES of speeds and feeds for any wide range of grinding jobs cannot be set up for all materials and finishes. Such data are available for cutting all kinds of material with tools, but grinding has as many as ten variables for each material and slight changes in operating conditions may drastically alter performance. For example, even though the speed and feed of a grinding wheel do not change, a small change in the wheel specification or the analysis of the material may make a considerable difference in the finish or the production rate.

The variables are the type of the abrasive, the grade of the wheel, the size of the abrasive grain, the wheel structure, the wheel speed, the speed at which the work rotates, width of the wheel face, the traverse, the in-feed and the personal peculiarities of the workman. In fact, a lesser or greater change in the action of the wheel may occur if one or more of the variables change without making an off-setting change in other variables.

Other variables that depend upon the job or the man doing it affect the speeds and feeds. These variables include the shape of the work, its balance, and its diameter compared to its length. Unbalance or great slenderness may require more work rests or other means of support. The nature of the work material—its hardness, softness, brittleness, or tensile strength—and the condition of the grinding machine have major effects, as does the manner in which the wheel is dressed. The surface finish and the accuracy of the work are important. Thus, it would be impossible to work out a definite table of feeds and speeds that would take in all variables, some of which cannot be even guessed until a job has been started.

It is possible, however, to list fundamentals governing wheel action so that an operator with a certain amount of basic knowledge can find a reasonably close place to start and know how to alter the variables so that he will more quickly arrive at the most effective speeds and feeds for any job.

Manufacturers of grinding wheels have worked out rather complete tables of wheel recommendations for various common jobs and materials. The best plan is to consult such a table. After selecting the right wheel, perhaps with the help of an abrasive engineer, the speeds and feeds can be fitted to the wheel by a little experimentation. The ranges in which the first selections of speeds and feeds will fall are a major purpose of this article.

Grinding wheels in action are subject to stresses of compression and shear. One close to the right specifications for the job is self-sharpening. That means that the bond of the wheel will break soon enough, but not too soon, to release the abrasive as it dulls. This permits new abrasive grains to contact the work as long as they cut. Grinding is a cutting operation, not a burnishing or rubbing operation. When a grain has finished its useful work, it will either break or be torn from the bond.

A too-hard wheel may be made to cut by dressing, but the wheel will come back to acting its real grade and will rub and burn. A too-soft wheel will give high production, but will wear rapidly. The abrasive will be torn out of the wheel too soon.

A wheel should be under such a stress that any increase will break the grain or pull them out of the bond or a lessening of the stress will let the grain become too dull.

The most important factors influencing stress are the speed of traverse, the in-feed and the rotational speeds of the wheel and the work. To increase any of these, other things remaining the same, will increase the stress and make the wheel act softer. To decrease them makes the wheel

in Cylindrical Grinding . . .

By correlating the variables and pointing out some of the less obvious ones, an effort has been made to devise a quick means for checking setting up cylindrical grinding jobs to eliminate the time and material loss encountered in "cut and try" procedures. Shortcuts and danger signals in cylindrical grinding are pointed out so the operator can more quickly and easily get work into production.

act harder. In addition to the effects on rate of production and wheel wear, the quality of surface will be changed.

Although most of these changes have effects that are apparent, some of them are the opposite of what they appear. Thus, increasing wheel speed does not, as first seem probable, increase production. On the other hand, by reducing the time that the abrasive grain remains in contact with the work, stresses are reduced, the wheel acts harder, and production is reduced.

It might seem that to reduce the work speed of rotation and the traverse would decrease production. This makes wheels act softer, increasing production by virtue of the heavier in-feed that is possible. Increasing the in-feed makes a wheel act softer by breaking away the abrasive grains due to the greater compression stress.

Thus a wheel can be made to act other than its true grade by changing its speeds and feeds. Some operators become so adept at this that they can manipulate a medium grade and grit to do heavy roughing cuts and also to obtain a fine finish. This saves money for job shops where wheels are infrequently used up and where wheels of compromise specifications are used. But seldom is the surface quality what it should be, and it takes a good deal of time to manipulate a wheel. For a mass production shop it pays to find the exactly correct wheel and to find the correct speed and feed for that wheel.

Where the same job recurs often in a shop, it is well to experiment and to tabulate the data. It will save time and give useful information for new jobs.

On every job a tabulation that includes the following data should be made: Roughing and finishing speeds listed separately; the type of machine and the machine number; a sketch of the part, its material, and the surface quality needed; the wheel specifications; rotational speed of both wheel and work; and traverse and in-feed should be tabulated. It is well to record data of this sort at frequent intervals as both wheels and machines are improved by makers.

Wheel speeds have been set within safe limits by the Safety Code. Wheels of vitrified and silicate bond are allowed to operate at 5500 sfpm for soft bond; 6000 sfpm for medium bond; and 6500 sfpm for hard bond. Resinoid, shellac and rubber bonds operate at higher speeds, 6500 sfpm for soft bond; 8000 sfpm for medium bond; and 9500 sfpm for hard bond. These bond strengths do not indicate cutting efficiency, but bond strengths only.

Obviously, surface feet per minute speed of the wheel will fall as the diameter of the wheel is reduced by wear. For good cutting action it is necessary, if the machine permits, to increase the wheel speed. If this is done, care must be exercised not to put a new wheel on a spindle set for an old one without changing the spindle speed. Otherwise the new wheel may break.

If formed wheels or multiple wheels of great difference of diameter are used, obviously the larger wheels will operate at higher speeds and so give a harder action. When grinding with multiple wheels, it is possible, by careful selection of the wheels, to have all wheels of varying hardness act alike. With formed wheels, it is necessary to select the best compromises in grade and speed.

Since fine surfaces are made by the cutting action of the wheel, it is best to select a softer wheel or, by using a fast work speed, keep the ratio between wheel speed and work low. In practice, the limit is where the work speed is so high that vibration starts. Another limiting factor is dimensional inaccuracies, as in long, slender work that is not sufficiently supported. As a rule, work speeds have to be kept lower than good grinding would dictate.

If other elements of grinding remain unchanged, a higher work speed makes the wheel act more free-cutting. That increases production and makes for an improved quality of work surfaces. In the early days of grinding, it was thought that a wheel that acted hard made for a better surface quality. This was perhaps a natural belief that a fine surface would be shiny. The harder wheel burnished the work, but did not cut. The hills on the work surface are polished and bent over, but the bent over bits of surface flake off under friction and wear fast. The surface that is exposed is poor. It is thus apparent that shine is not an indication of surface quality, and should not be sought for. A matte surface is to be preferred.

The run of cylindrical grinding of steel and cast iron is at work speeds of 60 to 100 sfpm. Roughing cuts are made at work speeds of from 75 to 80 sfpm. The same speeds are used for commercial finishes. Fine surfaces are ground at 90 sfpm.

A piece of steel 3½ in. diam can be rough and finish ground at about 92 sfpm. To eliminate any possible vibration that would have a bad effect on surface, a roll of 10 in. diam must be ground at a slower speed. For rough grinding, about 65 sfpm will be found right. For the finish cut, a speed of 130 sfpm will be needed. To get the high work to wheel speed rates that is needed to give a fine surface quality in the finish grind on a roll, the wheel speed is reduced to about 2500 ipm to prevent the vibration that would result if the work itself were speeded up.

Soft materials like aluminum alloys should be ground at high work to wheel speed ratios, as high as 150 to 200 sfpm. These soft materials do not set up the heavy stresses as do the harder materials like iron. Also they tend to load the wheel. It is therefore advisable to add to the higher work speed a lower in-feed. The wheel and work are in contact oftener and less material is removed at every contact.

If the work is out of balance, such as a crankshaft, it is necessary to prevent vibration and whipping of the work with a lower work speed. For a crankshaft, a work speed of about 35 to 45 sfpm is usually used. It is wise to begin with a high work speed and reduce it until the vibration stops.

The grinding of cams should be done at low work speeds because the cam roller must remain in contact with the master cam. Due to inertia, the master cam can easily lose contact at higher speed. For the ordinary automobile camshaft work, speeds vary from 15 to 30 sfpm, depending upon their shape, for the rough grinding. The finish grinding, as a rule, is at lower speed rather than a higher one. This allows time for the wheel to grind the sides of the cams, which are in contact with the wheel for less time than the cylindrical parts of the cams. A speed of from 7 to 15 sfpm, or about half that used for rough grinding is used for finishing.

For convenience, it is customary to use the wheel speed in rpm instead of work speed in sfpm when grinding very small cams. A typical speed used for automotive distributors is up to 150 spm. Cams that have large re-entrant curves, such as those used for radial engines are driven at very low speeds—as slow as 2 rpm. It must be remembered that these speeds are effective only if no other changes are made.

The traverse of the wheel over the work sets up stresses in the wheel. As traverse speed increases, stresses increase, the wheel acts softer, and cutting action is increased. It is, therefore, advisable to use a rapid traverse rate when making a roughing cut for rapid material removal.

The limit is the point at which the last cut merely overlaps the preceding one. A faster traverse than that resembles the cutting of threads and leaves spiral marks, useless for removing material and ruinous for surface finish.

A good plan on finish cuts is to have the wheel move over the work in fractions of its width, such as one-quarter or one-third. This is desirable on finishing cuts, as it makes for more even wheel wear and for better surface quality. The work speed and the width of the wheel determine the amount of traverse in making roughing cuts. The faster the work speed, the faster may the traverse be.

To get the highest rate of material removal, it is necessary to use as wide a wheel face as possible, since the wider wheel face can travel farther for every work revolution, thus within limits removing more material. The limitations are the machine design, the power of the motor that drives the wheel, and the size of the work. It is always best to use the width of wheel advised by the machine maker. The size of the smallest part in a lot of various sized parts may set the limit for the entire lot. More bits of abrasive are cutting when a wide wheel is used with rapid traverse, so it is bound to produce more than when using a narrow wheel with a deeper cut.

If trying to get a fine surface finish, it is not important how wide the wheel is, although the speed of the operation is determined to a great extent by wheel width. The desired surface quality may be produced with a wheel having a face of ½ in. or 1 in., but it may likely take longer than if the wheel face were wider. If a surface of good characteristics is desired, the traverse should be kept under ½ in. per work revolution. If the surface must be extremely fine, ⅛ in. traverse is about right, while the lowest possible traverse speed should be used to produce an ultra finish.

The *dwell* is an important part of the traverse. It is when the wheel passes off the work about one-third to one-quarter of its width, and is allowed to cut without in-feed or traverse. It serves to eliminate the shock that comes from an instantaneous reversal. Also, the front edge of the wheel does the most of the grinding and the after edge cleans up the cut, achieving size. All of the wheel face does not pass off the work. Yet if the end of the work is not to be oversize, grinding must go on until the predetermined amount of grinding has been done.

The wheel should not pass too far off from the work or dwell too long, because either will make the work too small at its ends. If the wheel dwells too long it may have a tendency to glaze and lose its ability to cut.

Traverse is closely allied with the in-feed or depth of the cut. In-feed has a great effect on the wheel wear, production, and the quality of the finish. The compression stresses set up in the wheel are chiefly dependent upon in-feed. It therefore determines to a large extent how the wheel acts. Too great an in-feed has the effect of distorting the work, and may cause inaccuracies or burns and hurt the surface.

If the in-feed is raised, the size of the work chips will be thicker, giving greater production. At the same time the higher compression stresses tend to make the wheel act softer and wear faster. The cost of grinding is affected by both the cost of the wheel, which depends on the wear, and the rate of production. It is necessary to strike an optimum balance between these elements.

In most grinding jobs, in-feed may run from 0.00025 to 0.004 in. per traverse. It is a common error to use too much in-feed. The wheel face will break if too heavy a cut is taken at the start, and will wear unevenly producing a poor finish on the work surface. On roughing cuts a heavy in-feed can safely be used on work that is built to stand it. To stand the pressure the work must be thick and short. It must be supported by a lot of work rests and the centers and center holes must be large and amply oiled. Pressures are higher when the wheels are hard in grade and of fine grit.

If it is desired to get a good finish on the work, it will save time if the wheel is fed regularly and slowly. A good surface is thus built up from the start of the operation. To get a surface of the finest quality, the wheel should finish out every cut by grinding the last traverse with no in-feed. This is known as sparking out or finishing out.

If surface quality is not the chief aim and if the work piece is big and well enough supported to withstand a heavy cut, the wheel may be fed in enough after each traverse so it cuts to the limit of its capacity without being forced enough to wear out of shape. This point can best be found by experimenting. It might seem that this is a place where a definite rule could be laid down. The reason for not setting a rule is that speeds and feeds vary.

As has been said, there is a close connection between traverse and in-feed in the effect of wheel action. It is especially noticeable in plunge cutting or straight-in grinding when the wheel does not traverse at all, but has a comparative light oscillating movement. If a heavy in-feed is used to obtain high production it may set up such pressures that excessive wheel wear results. To reduce the work speed will make the wheel act harder and prevent the tendency to act soft which has been caused by the increased feed.

It has been said that rough grinding should usually be done at fast traverse. A possible exception to this rule is cast iron. Sometimes better results are obtained on that material with a slow rate of traverse and a heavy in-feed so that the corner of the wheel does most of the grinding. For the finishing cuts on cast iron as few passes as possible should be made so that the wheel will not glaze too rapidly.

Thus cast iron and aluminum-alloy can be ground to best advantage by rough cutting them in a single pass with the full feed at the start of the operation and the traversing of the wheel. Finish grinding of the pistons is done by making two round trips of the table, four passes in all.

TABLE I

Suggested Causes and Cures of Grinding Troubles

TROUBLE	CAUSE	CORRECTION
Vibration, regularly spaced marks	Work speed too fast	Reduce work speed until vibration [illegible]
Spiral or thread like mark on work	Pressure too great	Reduce in-feed
Grit marks in finishing	Wheel not cutting right	Start cut with high traverse and high work speed, and finish with high work speed and low traverse speed, having wheel spark out
Uneven traverse lines	Worn traverse drive	Replace or adjust traverse drive
Glazed or loaded wheel	Hard wheel action	Speed up traverse rate
Burnt work		Decrease wheel speed
		Increase in-feed rate
Check marks on work	Hard wheel action	Speed up traverse rate
		Decrease wheel speed
		Increase in-feed rate
Wheel marks, tapered work	Soft wheel action	Decrease speed of work
Wheel won't hold cut or wears rapidly		Decrease traverse rate
		Decrease in-feed rate
Slick or shiny wheel	Hard wheel action	Increase in-feed
Work out of parallel	Too much wheel pressure	Decrease in-feed
Discolored work	Burning caused by bringing work to wheel too rapidly	Avoid bringing work to wheel too rapidly
		Decrease in-feed rate
		Stop belt or wheel slippage
	Wrong wheel	Get correct wheel grade
	Wrong or inadequate coolant	Correct coolant requirements

If work is suited to automatic in-feed, it speeds production, because the operator can keep busy at other jobs, such as grinding one job while making ready for the one following. Automatic in-feed must be used when the work is so delicate that unless speed is smooth and low the work will burn.

An electric shaver head must be ground carefully with a hydraulic in-feed machine at the rate of 0.006 ipm. Any jumping of the wheelbase will burn the work enough to scrap it because the edges of the razor are very thin. The final edge is only 0.002 in. thick.

Wrong grinding caused by wrong speeds of wheel or work or the incorrect feeds are listed in table I with suggested ways for overcoming them. The causes given are the most common ones and should be looked for before looking farther. Often they will correct the trouble.

AIME Annual

LEWIS E. YOUNG, consulting mining engineer, Pittsburgh, inducted as president of AIME for 1949.

AMIDST warnings of an approaching mineral crisis and pleas for wider exploration and exploitation of uranium sources, the 168th meeting of the American Institute of Mining and Metallurgical Engineers was held recently in San Francisco. Attended by some 1800 members of the association, the sessions at the meeting explored the broad economic and political phases of world mineral resources, as well as specific mineral and metal processing problems. The sessions of the metals divisions placed particular emphasis on powder metallurgy and titanium.

The annual banquet, held in the Palace Hotel, was highlighted by the awarding of the honors listed elsewhere in this report and the induction of Lewis E. Young, Pittsburgh consulting engineer, as AIME president for 1949.

Andrew Fletcher, president, St. Joseph Lead Co., New York, was installed as AIME vice-president, and Edward H. Robie, acting secretary of AIME, was confirmed as secretary of the association. Among the division officers inducted at the meeting were C. D. King, U. S. Steel Corp. of Dalaware, Pittsburgh, as chairman of the Iron and Steel Div.; F. N. Rhines, Carnegie Institute of Technology, Pittsburgh, as chairman of the Institute of Metals Div., and J. D. Sullivan, Battelle Memorial Institute, Columbus, as chairman of the Extractive Metallurgy Div.

Outstanding features of the technical program of the metal divisions were the Howe Memorial Lecture and annual Institute of Metals Lecture. The Howe lecture, delivered this year by John Chipman, head, Department of Metallurgy, MIT, was entitled "What is Metallurgy?" Dr. Chipman outlined the wide scope of a present-day metallurgist's activities—from mineralogy to application engineering—and discussed the need for a somewhat wider viewpoint and background if metallurgists of the future are to be properly equipped to carry on in this field of ever growing complexity.

The Institute of Metals Lecture, delivered this year by Egon Orowan, head, Metal Physics Group, Cambridge University, England, on "The Structure of the Cold-Worked Metal," was, in essence, a thorough survey of the present knowledge of structural changes due to plastic deformation.

The session on titanium, embracing four correlated papers, attracted particular interest in view of the extensive data presented covering the nature of titanium in the various forms encountered in smelting and in the smelting technique itself.

The papers comprising the session all dealt with work being done by the Titanium Div. of National Lead Co. The first paper in the series was entitled "Melting Points in the System TiO_2-CaO-MgO-Al_2O_3," and was prepared by H. Sigurdson and S. S. Cole, research chemist and assistant manager of research, respectively, Titanium Div., National Lead Co., South Amboy, N. J.

Melting equilibria for the $CaTiO_3$-$MgTiO_3$-TiO_2-$Al_2O_3.TiO_2$ portion of the system CaO-MgO-TiO_2-Al_2O_3 were presented in the paper to show the region of fluid melts obtained with sintered mixtures of the pure compounds when fused on a platinum strip furnace.

In the $CaTiO_3$-$MgTiO_3$-TiO_2 portion of the system, a wide range of mixtures melted between 1360° and 1485°C and were fluid within 100°C of the melting point. A eutectic of 1360°C was established at 60 mole pct $MgO.2TiO_2$ and 40 mole pct $CaO.TiO_2$. The region of fluid, low melting point mixture was reported to extend well above this region toward the TiO_2 point of the system.

$Al_2O_3.TiO_2$ was added to 50 mole pct to determine its effect on melting points and viscosity of the mixtures. More than 30 mole pct $Al_2O_3.TiO_2$ addition caused a sharp decrease in the fluid melt area, but did not appreciably raise the melting points.

Meeting • • •

Titanium and metal powder discussions pace metal divisions' discussions at San Francisco . . . Rhines and King installed as chairmen of two metal sections . . . Titanium smelting investigation described in this report.

The second paper in the group was entitled "Laboratory Smelting of Titaniferous Ores," prepared by D. L. Armant and S. S. Cole, research chemist and assistant manager of research, respectively, Research Dept., Titanium Div., National Lead Co., South Amboy, N. J. The authors pointed out that the smelting of titaniferous ores in the past has not been successful due to thickening of the slags in the furnace. Evaluation of published information as to the probable cause of failure in these attempts indicated that the presence of lower valence titanium oxide and the formation of titanium carbide contributed to the failure. It was apparent, the authors said, that severe reducing conditions, which are present in a blast furnace, had been one of the factors for such failures. The previous smelting operations had as a primary objective the recovery of iron from these ores. Under such conditions the highest recovery of iron could only occur with severe reducing conditions. In the development of this investigation, the authors applied the melting point data reported in the preceding paper by Sigurdson and Cole, with an extrapolation of these melting points being required due to the presence of other impurities in the ore. A study of the effect of varying FeO and reduced titanium content of the slag was also necessary before the data could be fully applied.

The furnace used in the first part of the study was a standard Ajax 6 kw high frequency induction furnace using a standard 2 lb graphite crucible. Normally the 1 lb batch required about 30 to 35 min to form a molten mixture and this was held in a fluid state for 10 to 20 min before removing from the furnace. A holding time of 15 min was found to be required to obtain the necessary reduction of the iron to the metal. The molten slag and metal were poured into a small metal mold and allowed to cool. The metal formed a solid button which was readily separated from the slag above it.

After the work with the induction furnace had indicated that the formation of a suitable slag could be accomplished, the investigation was shifted to a small arc furnace. This was a modified Lectromelt, size X, single phase. The furnace was operated at about 40 kva, using a 1½ in. electrode, manually manipulated. The furnace was lined with graphite. The ores used were MacIntyre and Baie St. Paul. A typical charge was 50 lb of MacIntyre ore, 7.5 lb of petroleum coke, 4.3 lb of limestone and 2.4 lb of dolomite.

Honored by AIME

MICHAEL TENENBAUM, metallurgical department, Inland Steel Co., awarded both the Robert W. Hunt and the Rossiter W. Raymond medals for his paper "Structure, Segregation and Solidification of Semi-Killed Steel Ingots."

J. D. SAUSSAMAN, blast furnace superintendent, Kaiser Co., Inc., received the J. E. Johnson, Jr., award for a paper entitled "Sinter Practice at Kaiser Co., Fontana.

EARL A. GULBRANSEN, co-recipient with J. W. Hickman (deceased), of the Institute of Metals Division Award for the paper "Electron Diffraction Study of Oxide Films on Iron, Cobalt, Nickel, Copper and Chromium." Dr. Gulbransen is associated with the Westinghouse Research Laboratories, as was Dr. Hickman at the time of his death.

LEFT

C. D. KING, chairman, operating committees, U. S. Steel Corp. of Delaware, Pittsburgh, who will head the Iron and Steel Div., AIME, for 1949.

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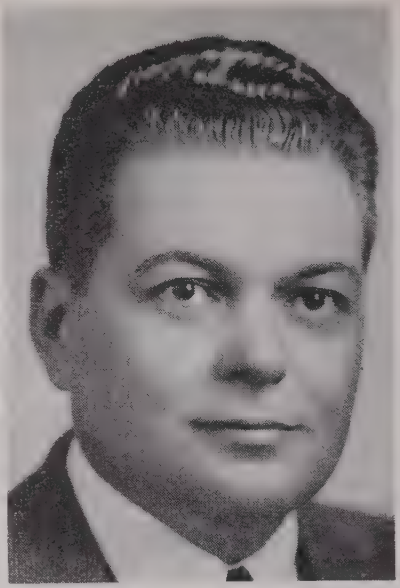
RIGHT

FREDERICK N. RHINES, associate professor, metallurgical engineering, and member of staff, Metals Research Lab., Carnegie Institute of Technology, Pittsburgh, who was installed as chairman of the Institute of Metals Div., AIME.



The total smelting time varied from 2 to 3 hr, depending upon the general operating procedure, and the temperature of the slag as it flowed from the furnace was normally about 1500°C. The slag was tapped into a ladle in which iron settled out in the bottom and the slag formed as a separate layer on top. It was found that the slags which had proven most satisfactory in the induction furnace could be duplicated on a larger scale in the arc furnace.

Observations of the reduction definitely indicated that the slag and carbon were reacting, and the reduction was found to be affected by the type of carbon used. Coke, due to its high surface area, was better suited for a reductant than anthracite. Due to the high secondary voltage delivered by the transformer, the electrodes could not be maintained in the slag during the final period of reduction. The change in the resistivity of the slag was quite apparent and appeared to be a function of the ferrous iron content.

Summing up, the authors said that ilmenites having 38 to 44 pct TiO_2 were smelted to produce fluid slags with 65 to 69 pct TiO_2; and that a high titanium slag can be produced in which the formation of appreciable amounts of Ti^{3+} may be avoided. The final slag with 62 to 69 pct TiO_2 requires 5 to 11 pct MgO and 9 to 13 pct CaO to have the desired fluidity from MacIntyre and Baie St. Paul ilmenites.

The third paper in the group was entitled "Petrology of High Titanium Slags," and was prepared by C. H. Moore, Jr., and H. Sigurdson, department supervisor and research chemist, respectively, Research Laboratory, Titanium Div., National Lead Co.

In summarizing the work covered by the paper, the authors pointed out that when lime and magnesia are used as fluxes in smelting titaniferous ores a fluid, digestible slag low in iron and high in titanium oxide is produced, consisting of $(Fe,Mg)O.2TiO_2$, $CaTiO_3$ and minor amounts of glass (or its devitrification products). The flux additions are added to the ore in relative amounts to crystallize a ratio of $(Fe,Mg)O.2TiO_2$ to $CaTiO_3$ of near the eutectic proportions, which is 60 pct $(Fe,Mg)O.2TiO_2$ and 40 pct $CaTiO_3$.

If in the course of reduction of a molten slag containing the correct flux additions, the melt is frozen while still containing 15 pct FeO, it consists of $FeO.TiO_2$, $(Fe,Mg)O.2Tio_2$ (containing a high proportion of FeO), $CaTiO_3$ and glass. If this reduction is stopped when 8 pct FeO is present the ilmenite occurs only as acicular needles in the glass and $(Fe,Mg)O.2TiO_2$ (high in iron) is the principal phase with $CaTiO_3$ as the secondary phase. If the reduction is stopped at 2 to 6 pct contained FeO, optimum slag structure is obtained and a fluid, digestible slag results. This slag consists of tabular laths of $(Fe,Mg)O.2TiO_2$ (low in FeO) as the primary phase, blocky $CaTiO_3$ as the secondary phase and partially devitrified glass in the interstices.

If reduction is continued beyond this stage the $(Fe,Mg)O.2TiO_2$ shifts to an oxygen deficient structure and finally to equidimensional crystals of a probable $MgTi_2O_4$ composition. Further reduction yields titanium oxycarbides and freezes the melt.

$(Fe,Mg)O.2TiO_2$ shows a complete isomorphous replacement of iron by magnesium. It also forms a solid solution with as high as 12 mols of TiO_2 under reducing conditions without the occurrence of rutile or reduced titanium oxides in the slag. This property has made it possible to successfully form a low iron, high titanium slag with minimum amounts of flux additions. The structural shift of this compound with variations in time and rate of reduction is illustrated.

A report on a relatively large scale test on the removal of iron from ilmenite ore by electric furnace smelting was contained in the final paper in this group. The paper, entitled "Pilot Plant Smelting of Ilmenite in the Electric Fur-

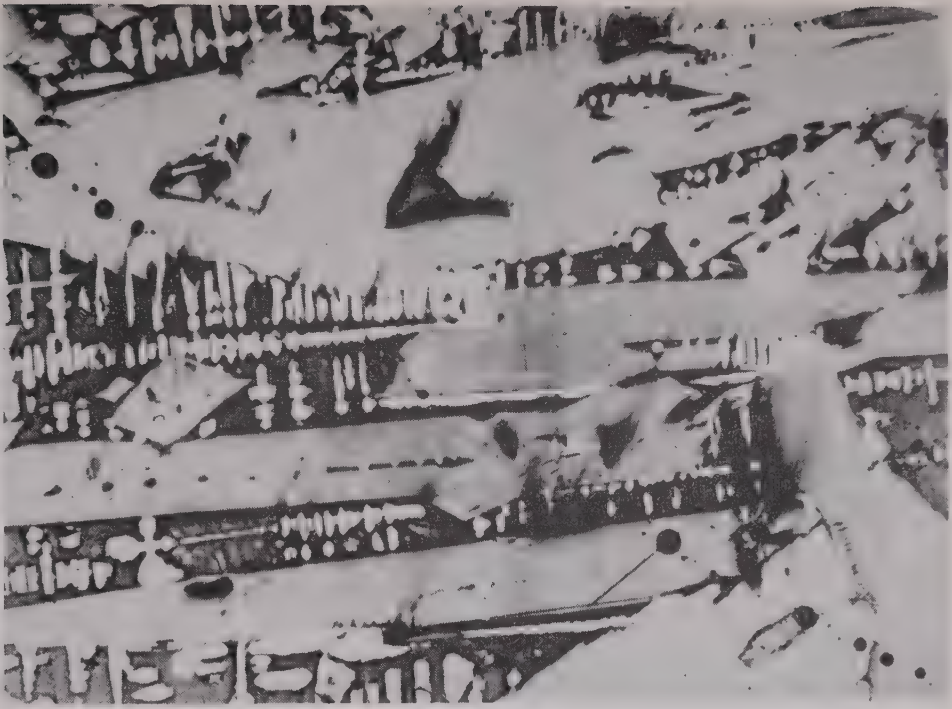


FIG. 1 — Micrograph of a typical ideal slag, showing large laths of ferruginous magnesium ditanate, dendritic calcium titanate and ground mass of glass. 300X.

nace," was prepared by C. K. Stoddard, National Lead Co., South Amboy, N. J.; S. S. Cole, assistant manager of research, Titanium Div., National Lead Co.; L. T. Eck, senior development engineer, Titanium Div., National Lead Co., and C. W. Davis, chief, Boulder City Branch, U. S. Bureau of Mines, Boulder City, Nev.

In the course of this investigation, a total of 36,190 lb of titanium rich slag and 19,057 lb of pig iron were produced. The data and experience of this pilot plant campaign, according to the authors, indicate that the method can be of importance to the titanium pigment industry, as the removal of the iron greatly reduces: (1) The amount of sulfuric acid required to dissolve the titanium dioxide; (2) the subsequent burden of removing the ferrous sulphate from the solutions; and (3) the ultimate disposal problem of ferrous sulphate, which has a limited market. The iron is obtained as a pig iron that has a better market.

This method is limited to ilmenite ores in which the titanium dioxide is diluted with iron oxides, usually magnetite, which can be reduced

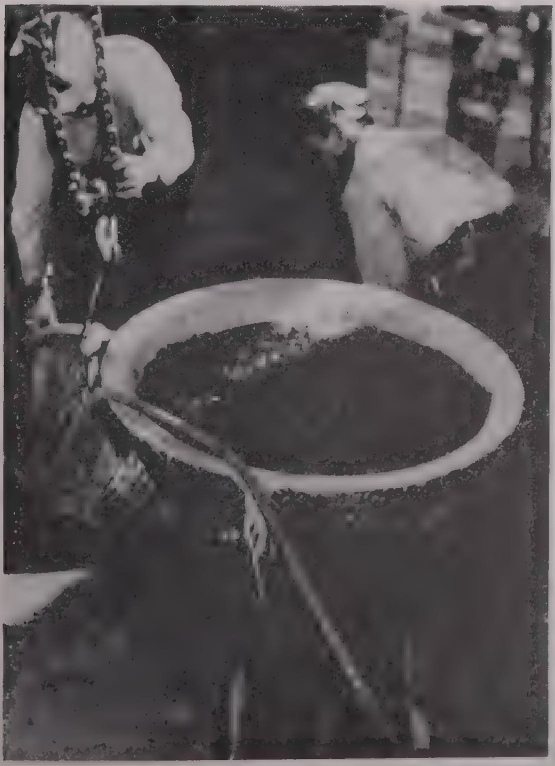
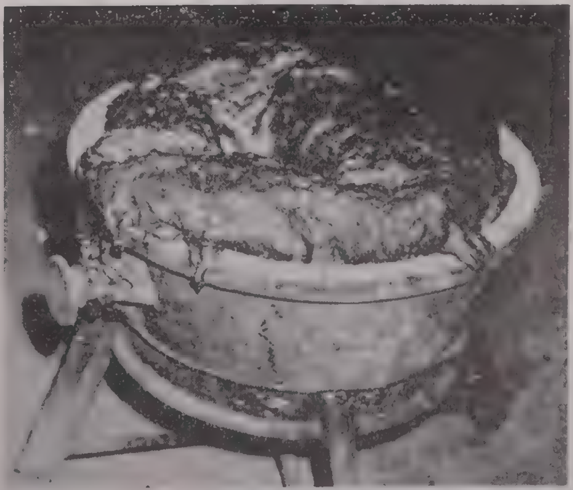


FIG. 2—At left is a ladle full of properly smelted titanium-rich slag, while below is a ladle full of under-reduced slag.



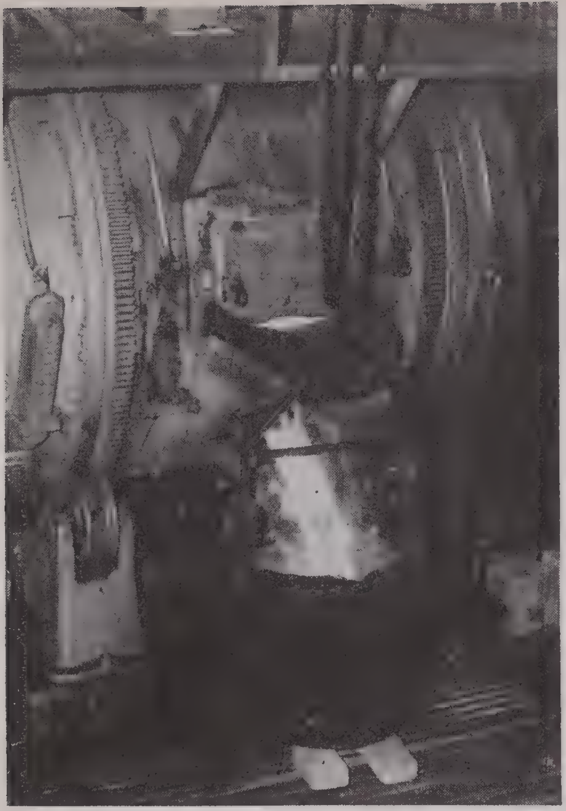


FIG. 3—Pouring from the 2500-lb arc furnace used in the investigation of ilmenite ore smelting techniques.

readily by carbon. This must be accomplished with only small or negligible additions of fluxes so that the resulting slag will be substantially enriched in titanium dioxide. Preliminary work in the research laboratories of the Titanium Div. of National Lead Co. established that this can be accomplished by using calcium and magnesium oxides. Slags containing 65 to 70 pct titanium dioxide are readily obtained from titaniferous ores originally containing 30 to 45 pct titanium dioxide. The solubility of these slags in sulfuric acid indicates that they are acceptable raw material for the production of pigment. A micrograph of a typical ideal slag is shown in fig. 1, while fig. 2 illustrates the physical appearance of a properly smelted slag and an under-reduced slag.

An objective of the work was to produce from 15 to 20 tons of slag that could be used in pilot plant facilities and would ultimately be converted into a marketable titanium pigment. The preliminary research work had established the conditions under which the slag would be acceptable for present production facilities working on ilmenite, without upsetting the operation and adjustment of a large commercial plant. An actual pilot plant smelting test was needed.

TABLE II

Power Requirements for Small and Large Furnaces

	Small Furnace	Large Furnace
Weight of ore charged, lb........	500	2,000
Total power to furnace, kwh......	420	1,500
Power required per 2000 lb ore....	1,680	1,500

The production of 15 to 20 tons of slag would also give data, the paper stressed, that would be valuable for designing and operating a semiworks or full-scale slag-producing plant. The actual smelting work described was divided into two parts: (1) A series of 500 lb smelting tests in a small furnace, and (2) a production campaign in a larger furnace capable of taking 2500 lb of ore (actually 3085 lb of burden). The experience gained from the 500 lb furnace proved exceptionally valuable, both in technical knowledge of the smelting process and operational experience, and contributed extensively to the smooth operation of the large furnace.

The ore used in these investigations was from the National Lead MacIntyre Mine in Essex County, N. Y., and from the Baie St. Paul deposit near St. Urbain in Canada. The MacIntyre ore, as received, consisted of two kinds: Rod mill feed that represented run-of-mine ore after cobbing out part of the waste, and ilmenite concentrates from the milling operation at the mine.

The large furnace, fig. 3, used in this investigation consisted of a cylindrical steel shell, mounted horizontally on trunions that permitted it to be tilted for discharge. A low tap hole was provided to remove metal from beneath the slag. Power was introduced by means of three 6-in. graphite electrodes entering through the top of the furnace. The bottom half of the furnace was lined with carbon blocks and bricks, while silica fire brick, parted with one layer of chrome brick, lined the upper half. This furnace would hold about 2500 lb of burden normally; tilted backwards, 3000 lb could be accommodated.

Average analysis of slags and pig iron obtained from the two smelting campaigns in this furnace are given in table I. Both the campaigns were about the same length and were terminated by a failure of the carbon lining below the slag line at each end wall, a failure ascribed to the particular design of this furnace.

A comparison of power requirements for the small and the large furnaces is given in table II.

The pig iron tapped from this furnace was cast into pigs, with 650 to 800 lb being obtained from each heat. The low silicon content of this iron does not favor the decomposition of the cementite, and a hard, brittle, white pig iron was obtained. Although the slag takes up about 75 pct of the sulfur in the charge, sufficient enters the iron to exceed the amount permitted in pig iron.

Desulfurization of this pig iron by means of highly basic soda ash slags added to the ladle was tried with moderate success. It was not convenient at the time the test heats were run to construct the additional equipment required for this phase of the problem, hence this aspect was left for study at some future date.

As with most ilmenite ores, vanadium was present in the ilmenite used in this investigation, and the major portion of this vanadium remained in the slag. However the conditions necessary to reduce the vanadium in the pig iron apparently were not present in this investigation.

Electrode consumption for the large furnace was about 19 lb per ton of ore, a figure which could probably be considerably lowered in larger operations.

Data presented in the paper indicated that TiO_2 recovery, not including the TiO_2 in the discarded crusts, was 92 pct. The recovery of iron was somewhat low, even when the iron contained in the slag was credited to the pig iron, with only 85.4 pct of the iron charged being accounted for. These discrepancies were credited to material handling and fume losses, spills, iron and slag left in the cracks between the bricks and lining of the furnace, and crusts held in the furnace hearth after the last tap.

A study of refractory behavior was one of the considerations of this work as the preliminary researches had indicated that only carbon or graphite were capable of withstanding the slagging action of the titanium slag. Because of the oxidizing character of ilmenite, some attack of the lining was expected, but experience in the small furnace showed that lining consumption was controllable to a certain extent. For instance, the carbon lining showed only slight attack after repeated smelting heats at moderate power-input levels, while high power-input levels were very hard on the lining.

TABLE I

Average Composition of Products From Large Furnace—1st Campaign

Slag		Pig Iron*	
Constituent	Wt, Pct	Constituent	Wt, Pct
TiO_2	67.0	C	3.85
CaO	10.0	S	0.69
MgO	7.2	Si	0.16
SiO_2	4.5	Fe	95.32
Al_2O_3	4.8		
FeO	6.2		
S	1.2		

* *Ed. Note — Data presented elsewhere in the paper indicated that in a typical series of four heats, an average vanadium content of 0.067 pct was found. In these same four heats, titanium content, based on spectrographic determinations, averaged 0.025 pct.*

Localized high temperatures in the ends of the larger furnace (due to the furnace design) quickly burned out the carbon lining. Essentially the same thing happened in the small furnace when the output was forced by increasing the power input level during extended operating periods near the last of the work.

It would appear, the authors said, from the relatively short campaigns of this work, that a lining would give its best service under a proper balance between the heat transfer through the wall of the furnace and the power input. Probably the formation of a crucible or shell of solidified charge would give the extended service necessary for a commercial operation. There was some indication that this condition existed in the small furnace at times.

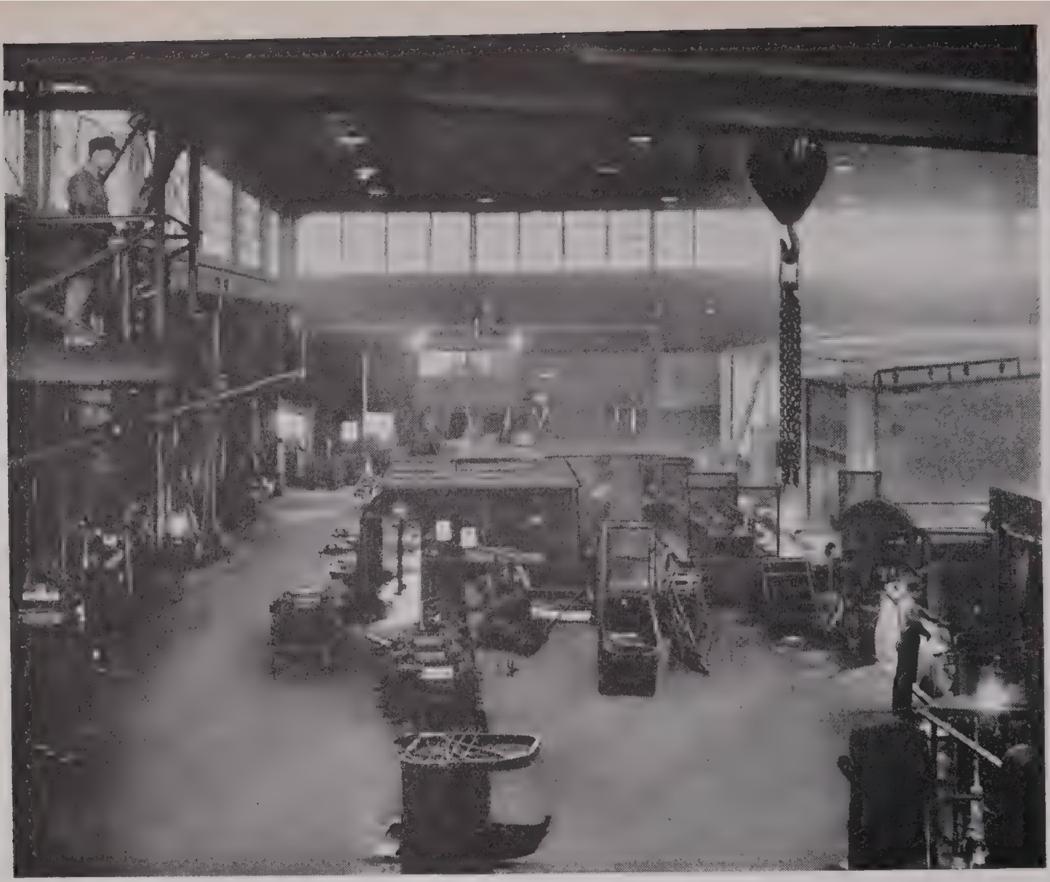
Keystone Steel & Wire Modernizes Rod Mill

KEYSTONE Steel & Wire Co. has just completed a modernization and rebuilding program of their rod mill. As a result of the $700,000 modernization program, output of the plant, located in Peoria, Ill., has been increased by 20 pct and better balanced operations throughout the plant have been achieved.

Prior to this remodeling, the Keystone rod mill had been in almost continuous operation since it started in 1917. Steel production at Keystone has recently been speeded up by the use of oxygen in the openhearth furnaces. Improvements made in other departments finally necessitated a change to permit greater rod rolling capacity to maintain well balanced operations, and a method of increasing the mill's rod rolling practice was conceived which speeded up rod, as well as billet, output.

The new mill is a 19-stand mill and reduces a 2¼ in. square billet into a round rod, slightly less than ¼ in. in diam. At top speed the finishing rolls deliver the rod to the reelers at a speed

INSTALLING conduit leading from mill controls to motor room of rebuilt rod mill. The conduit was formed before rod mill repairs started, numbered and keyed to drawings, then stored pending need.



VIEW of Keystone's rebuilt rod mill (above). Changes visible in photograph include enlarged new concrete motor room and raised pulpit for reeler at center background. View of conduit below floor of motor room (below). Formation of the conduit before rod mill repairs started resulted in a tremendous saving not only in electricians' time but in the length of time the mill was down for rebuilding.

of 4500 fpm. The old mill consisted of 18 stands which rolled a 1¾ in. square billet into a ¼-in. round at 3950 fpm. The speed of the four new Morgan laying coilers, built to handle 500-lb coils max, is varied automatically through electronic controls as the speed of the finishing mill changes.

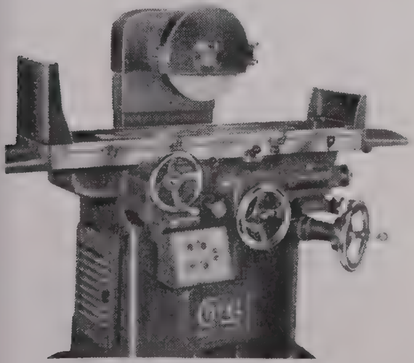
Equipment changes in this modernization program included the addition of two large United roughing stands to handle the larger size billets. Some of the intermediate stands were transferred to higher speed positions in the mill, thus increasing the delivery speed in tonnage. Relocation of existing mill motors and the addition of a 1000 hp motor to drive the finishing mill through a cluster gear unit rather than a belt necessitated the enlargement and complete rebuilding of the motor room.

Through diligent scheduling and careful preparation, shutdown time was kept at a minimum. For instance, side walls of the motor room were poured while the mill was operating; all conduit was preformed, numbered and keyed to blueprints for immediate installation and all foreseeable material needs were on hand before work started. A large inventory of rods was built up during the summer months to insure an adequate supply to the wire drawing block and product manufacturing department during the shutdown.

New Production Ideas . . .

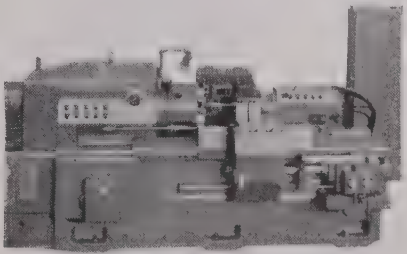
Cold treating cabinets, a surface grinder, automatic lathes, a planetary thread roller, a vertical honing machine, squaring shears, a mechanical dryer, and small tools and attachments such as a broaching attachment and an aligning shank die head are described this week. Material handling equipment includes a floor type tow conveyer, an improved powered wheelbarrow, and a tote pan lift truck.

SUITABLE for either tool room requirements or production line work, an 8x24 in. hydraulic surface grinder has three spindle speeds, 1750, 2200, and 2600 rpm, and table speeds up to 90 fpm. A 12-in. wheel is powered by a 2 hp motor. Other features are the interchangeable, sealed-for-life quill type spindle with pre-loaded bearings, elevation handwheel at apron, simplified hydraulic system with smooth table reversal, and automatic pressure lubrication to bearings and ways. This No. 35 grinder uses the same wet grinding, wheel truing, dust exhaust and high speed attachments as used on the No. 20 surface grinder. *Covel Mfg. Co. For more information, check No.* 1 *on the attached postcard.*



Automatic Lathe

A NEW development for high production turning is a hydraulically operated, electrically controlled automatic lathe with an automatic work cycle. Extreme rigidity and close support of cutting tools assure vibration-free turning, even on eccentric forgings and make it possible to use tungsten-carbide tools at their maximum efficiency. Model DB is for between center work, and Model CD, for chucking and fixture work. A variety of tooling arrangements and flexibility is accomplished by a combination of the various types of standard rear slides and front carriages. Two speed ranges with automatic speed change during the automatic work cycle make the machine suitable for the facing and turning operations of flanged workpieces in one chucking, maintaining the correct cutting speed from the largest to the smallest diameter. Push button controls for all functions provide effortless operation, and simplified tooling setups assure minimum changeover time. The machine is a self-contained unit, including hydraulic system, electric controls and cutting lubricant system. The lathe illustrated is tooled for turning a front automobile axle. It will handle turnings, such as rear end bevel pinion gear shafts, gear box parts, and shafts up to 36 in. from the smallest diameters to 4 in. OD. *Morey Machinery Co. Inc. For more information, check No.* 2 *on the attached postcard.*

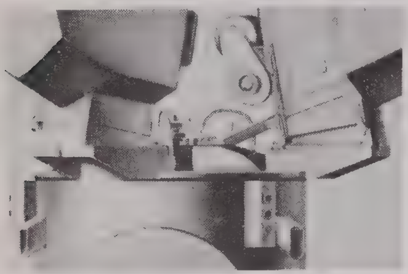


Low Temperature Cabinets

RUGGED construction, simple control, and quick pull-down of temperature to as low as -240°F are features claimed for a line of low temperature mechanically refrigerated cabinets. The self-contained refrigeration system employs two stages of compression with refrigerant control being handled by an arrangement of high-side floats. Four ranges of temperatures produced for low temperature work are: 0 to -50°, -50° to -80°, -80° to -120°, and from -140° to -240°F. Industrially, the cabinets can be used for shrink fits, treatment of metals such as normalizing by intermolecular stabilization, speeding the aging of ferrous metals or retarding the aging of aluminum. *Industrial Cold Co. For more information, check No.* 3 *on the attached postcard.*

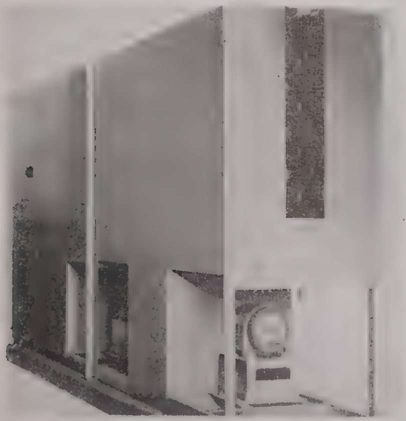
Thread Roller

WITH a production rate of 750 headed machine or cap screws per min at normal hardness or 375 per min pre-heat treated, a new planetary thread roller uses one externally threaded continuously rotating cylindrical inner die, and three internally threaded stationary external segment dies. Three independent automatic feeds deliver blanks to each of the outer dies. Blanks having three different types of heads can be rolled simultaneously, if desired, and drop into separate work baskets to prevent mixing. Three starter fingers introduce the three blanks to the starting ends of the outer dies, and when the screws have rolled in a planetary manner about half the length of the outer dies, three succeeding blanks are introduced. Six screws are always being rolled at any given instant. When rolling preheat treated stock a single lobe cam is substituted for the normal double lobe cam and the blanks are started half as often. Only a few minutes is required for setup. The outer dies are identical. Therefore, when setting up, matching the inner die with one outer die automatically takes care of the other two dies. Changeover from one pitch to another can be accomplished in 20 min or less. This Beco Model 312 thread roller is entirely mechanical except for the electrical equipment. Work range is No. 4-48 to 5/16 in.-18 headed machine or cap screws. Maximum shank length is 3 in.; 3 in. is max thread length. *Batchelder Engineering Co. For more information, check No. 4 on the attached postcard.*



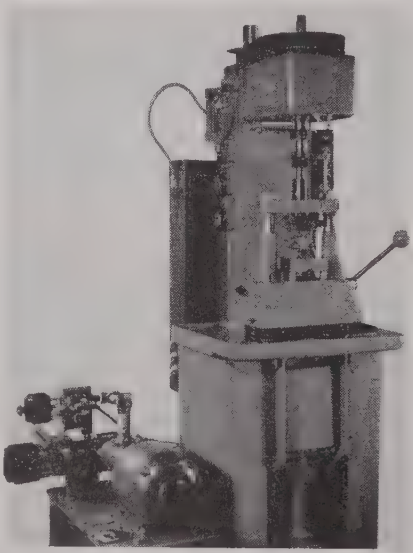
Spotless Dryer

A NEW mechanical dryer has been designed for the drying of highly polished metal surfaces without water spots, stains or streaking. Metal parts are handled on monorail or racks on a continuous production basis. High velocity jet nozzles specially designed and located reduce drying time to a minimum. They are directional and adjustable. Combinations of cold and hot air drying are employed. Fans, heating units and motors are all located within the framework. Where overhead space permits, these units may be suspended from the ceiling. Air for drying can be heated by steam, gas or electricity. *Optimus Equipment Co. For more information, check No. 5 on the attached postcard.*



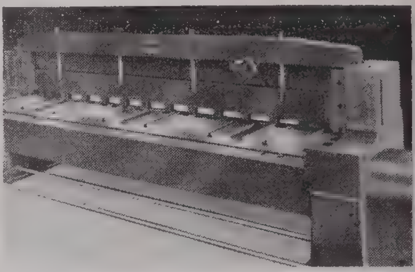
Vertical Honing Machine

MODEL B7 vertical honing machine is hydraulically operated, electrically controlled and adaptable to work from ½ to 4 in. ID and up to 6 in. long. Timing cycle is adjustable from 3 to 180 sec. Size control is manual by a graduated dial. The reciprocating table is 6x18 in. and has 8-in. travel. A variable speed drive to the honing spindle is adjustable. The honing stones are fed out and contracted automatically, with adjustable pressure and rate of feed. The machine is supplied complete with all electrical controls, self-contained hydraulic unit, coolant pump and tank. *Staple Engineering Co. For more information, check No. 6 on the attached postcard.*



Squaring Shear

A NEW power squaring shear with capacity of 10 ft, 10 gage mild steel is constructed of semi-steel, with bed, end-frames, knife-bar, holddown and top-girder all one-piece castings. To insure accurate cutting, the bed is squared with the end-frames in all three directions. Ways for holddown and knife-bar travel are accurately machined from steel and hand scraped for perfect bearing so that travel is true and neither rocks or deflects. Eccentrics for moving the knife-bar through the stroke cycle are housed between two bearings within each end-frame. On each revolution, the eccentrics dip into an oil bath providing constant, thorough lubrication and cool operation. The nine-jaw clutch is hardened, forged alloy steel, with a non-repeat unit built into it. It can be set for continuous or single stroke shearing. A front-operated gage is adjustable to 0.0078 in. Other standard equipment includes alloy blades with four cutting edges, steel front gage, a 7½ hp motor and all electrical equipment. *Wysong & Miles Co. For more information, check No. 7 on the attached postcard.*



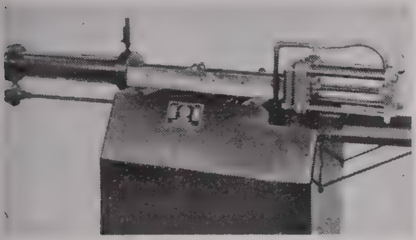
Automatic Arc Stabilizer

AN AUTOMATIC arc stabilizer, the Missing Link, can be used with all welding processes and features a new circuit that reduces RF radiation and a new control that automatically cuts off operation when the welding arc is broken. A finger-tip switch mounted on the electrode holder is flicked on to resume operation. Elimination of idling also results in cooler, longer-wearing spark gap points. Automatically starting the arc eliminates the necessity of direct contact of the electrode with the workpiece to establish and maintain the welding arc. It also makes possible the use of any welding rod, ac or dc, bare or coated. *Mid-States Equipment Corp. For more information, check No. 8 on the attached postcard.*

Mid-States
Missing Link

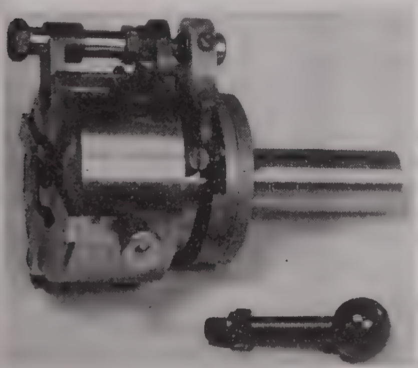
Broaching Attachment

AN ATTACHMENT for a pull broaching machine has been devised for push broaching two holes at one time, maintaining both relationships and hole center spacing. The two broaches are fastened permanently into the ram of the fixture that is in turn pushed by the ram rod of the broaching machine. The part is located on the head end of the broaching fixture and the operation consists of pushing the broaches through and pulling them back out. The return stroke releases the part, that in turn drops down into the tray. *Zagar Tool, Inc. For more information, check No. 9 on the attached postcard.*



Aligning Shank Die Head

CORRECT alignment between work spindle and die head chasers is made possible with the new Style DS convertible, self-opening die head that has a built-in aligning shank. This aligning shank provides the means of quick centralizing of die head with the work when machine misalignment exists. The new DS reduces overhang and maintains die head rigidity and initial machine capacity. Alignment is made by loosening two square head screws at the rear of the head, allowing the head to float freely. A true running work blank is then threaded by slowly feeding the head full length of thread to be cut. The machine is then stopped and the two screws are tightened. The die head is then in proper alignment with the work spindle. Aligning plugs for centralizing these heads are available. *Geometric Tool Co. For more information, check No. 10 on the attached postcard.*



Welding Hose

ONE-PIECE construction and touch identification are features of dual-line welding hose. The two hose are built securely into one cover; the oxygen side is smooth and has a green Oxygen label at 5-ft intervals, and the acetylene side is corrugated. Flexibility and lightweight are other features. Each tube is reinforced with a braid of strong cords to withstand the pressures of both the oxygen and acetylene. Hose is available in 3/16 and ¼ in. sizes in coupled or uncoupled lengths. *Gates Rubber Co. For more information, check No. 11 on the attached postcard.*

Carbide-Tipped End Mills

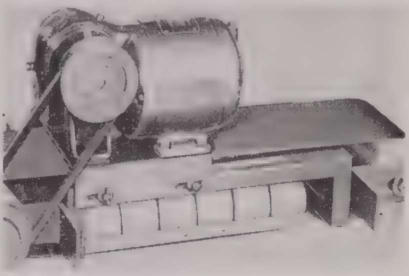
A COMPLETE line of carbide-tipped end mills and suitable holders feature the Lovejoy positive locking device that holds the mills immovable in the holder, while allowing endwise adjustment and quick change of cutters. An alternate adjusting shoe adapts the cutters to standard, set-screw type holders. Two-flute end mills in ½ to 1-in. diam and four-flute mills from ¾ to 2 in. diam, all having 1-in. diam shanks assuring interchangeability, are available for cutting cast iron or steel. One-flute end mills, 1-in. in diam, are used when low cost and ease of sharpening are primary considerations. *Lovejoy Tool Co. For more information check No. 12 on the attached postcard.*

Super Alloys

A CLASS of metals named Super Alloys has been developed for high temperature service and withstands high stresses at temperatures from about 1200° to 2000°F. About 50 compositions are available, each containing at least two of the following elements in major amounts: chromium, nickel, cobalt, molybdenum, and tungsten. Minor amounts of carbon, manganese and silicon are also present in each composition. Properties vary with the specific application. *Tempil° Corp. For more information, check No. 13 on the attached postcard.*

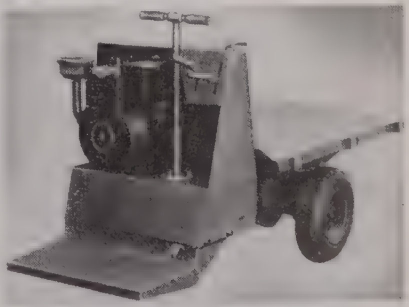
Perma-Plate Magnet

AUTOMATIC separation of magnetic and non-magnetic materials with an Alnico plate magnet has been achieved with the self-cleaning Perma-Plate designed to provide automatic protection for crushers, grinders, pulverizers, stokers and other machinery susceptible to tramp iron damage. It can be installed over conveyer belts, spouts or chutes. The unit consists of a heavy duty Perma-Plate magnet and a motor-driven, endless cross belt. The magnet's force attracts and holds tramp iron to the underside of the cross belt, and it is carried to the side beyond the influence of the magnetic field where it is discharged. The Perma-Plate is effective with wet or dry materials and the magnet itself can be completely submerged. *Dings Magnetic Separator Co. For more information, check No. 14 on the attached postcard.*



Improved Powered Wheelbarrow

BETTER all-around performance is claimed for the Moto-Bug by improvements that increase the versatility for handling materials. An optional 4-ft stake platform body is interchangeable with the 10-cu ft capacity hopper body; a riding step for the operator is available; and a dual wheel has been placed on the direct steering mechanism. The flatbed platform gives the machine a 1200-lb capacity for truck handling loose loads, skids and bins. The platform body may be tilted for unloading certain kinds of heavy ma-

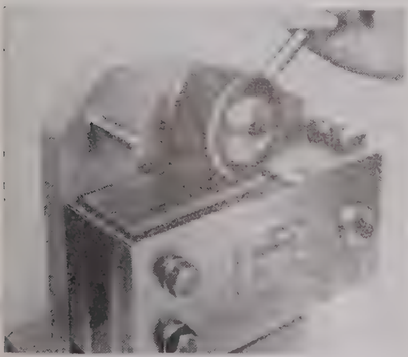


terial. The machine is powered by a 4 hp gasoline engine, at speeds from 1½ to 4 mph in forward and reverse directions. Wheels are traction tread pneumatic tires. *Kwik-Mix Co. For more information, check No.* 15 *on the attached postcard.*

Bin Shake-Out Vibrators

DESIGNED for installation on hopper and storage bins, pneumatically-operated vibrators deliver hammer-like blows to prevent the arching-over and plugging of sand, coal, ore, lime slag and chips in bins having capacities of one to several-hundred tons. They serve to assure constant and rapid flow of materials and eliminate the need for manual pounding or beating. Type F vibrators are suitable for either intermittent or continuous duty. Vibration is developed by the oscillation of a steel piston that travels the length of a cast semi-steel cylinder body under air pressure. Vertical construction permits operation in any position. Six sizes have piston diameters ranging from 1¼ to 4 in., overall widths from 3 to 7½ in. and overall lengths from 6 to 15 in. Speeds range from 2100 to 750 vibrations per min, when used on line pressure of 80 psi. *Cleveland Vibrator Co. For more information, check No.* 16 *on the attached postcard.*

Plate Marking Machine



A SIMPLE rolling machine stamps data into etched name plates at a marking speed of 25 to 30 per min. The machine is a simple cast iron angle plate from which are extended a block containing a double row precision bearing roll against which the back of the name plate rolls and an extending bearing shaft that carries the engraved steel roller die or rotary type holder that rolls the markings into the name plate. The machine may be attached to a work bench. An adjustable stop insures correct position of the plate and an adjusting screw regulates depth of mark. *Acromark Co. For more information, check No.* 17 *on the attached postcard.*

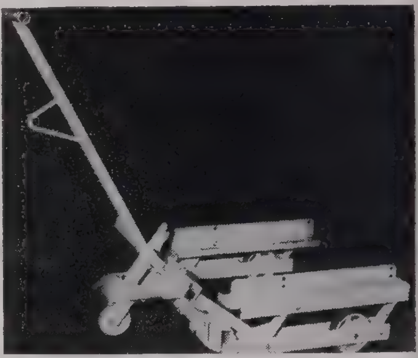
Floor Type Tow Conveyer

A CONTINUOUS chain conveyer with the chain running in a steel slot below the floor uses a simple towing pin device bolted to the end of the standard four-wheel truck or trailer. Standard two-wheel trucks may be used with a dolly. Trucks are set in motion by dropping the pin into the slot. Pusher dogs spaced at intervals on the chain engage the pin and move the truck along the Towveyer route. Lifting the pin disengages the truck. Trucks may be engaged or disengaged at any point and hold spacing as they travel around the circuit. No part of the conveyer projects above the floor. The chain has an ultimate strength of 48,000 lb and ball bearing wheels on the chain permit speeds as high as 100 fpm. *Jervis B. Webb Co., For more information, check No.* 18 *on the attached postcard.*

Drum Cleaning Machine

DRUM cleaning has been simplified with a machine that consists of a welded under-frame on which is mounted the drum holding the cleaning apparatus. The drum is held rigid between two circular end pieces by means of compressed air pressure. A chain drive, powered by an electric motor, revolves the drum. The cleaning is performed by disk-center wire wheel brushes containing 0.014 in. wire and the upper framework is moved manually as each section of the drum becomes thoroughly cleaned. A motor-driven suction fan absorbs the dust and dirt. *Osborn Mfg. Co. For more information, check No.* 19 *on the attached postcard.*

Tote Pan Lift Truck



ADJUSTABLE in width and lowered height, a new lift truck can be used with standard tote pans ranging in width from 8 to 24 in. Two styles are offered, a narrow model handling tote pans 8 to 16 in. wide and a wide model carrying pans from 16 to 24 in. The lowered height of the lifting forks can be adjusted from 2½ to 7½ in. Forks that lift and carry the pans are 22 in. long. Loads up to 1000 lb can be elevated by a single downward movement of the towing handle. Forks automatically lock in the raised position and are released by a simple pedal arrangement. *Lyon Raymond Corp. For more information, check No.* 20 *on the attached postcard.*

Lightweight Compressor

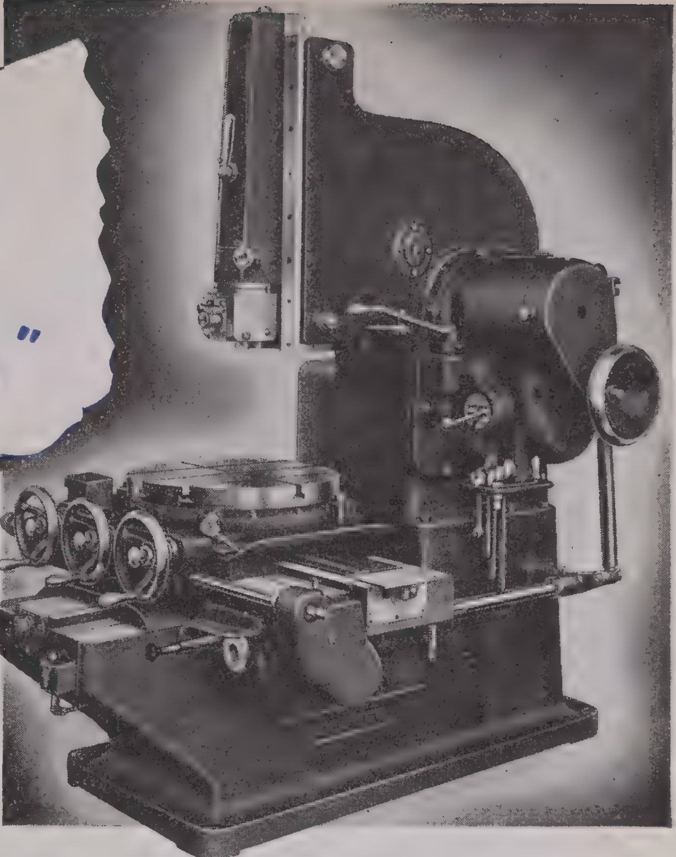
A NEW 7 cfm lightweight compressor, known as the Little Workhorse, consists of a V-type, 2 cylinder, single stage compressor direct connected to a 4½ hp air-cooled engine. The compressor has a 2½-in. bore with 1¼-in. stroke and operates at 3000 rpm. An automatic centrifugally-actuated clutch momentarily frees the engine from the compressor for starting, but re-engages at about 1500 rpm. The machine is designed for operation in all temperatures and is tested for the range of -65° to +130°F. Continuous operating pressure is 100 lb, but the unit may be run intermittently up to 150 lb pressure. *Davey Compressor Co. For more information, check No.* 21 *on the attached postcard.*

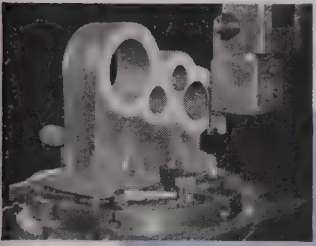
Scale Weight Printer

A NEW weight printer offered as an integral part of Yale Load King industrial scales prints actual weights in numerals 9/32 in. high, without additional printing or mental calculation. The various weights in a series can be identified by printing opposite the recorded

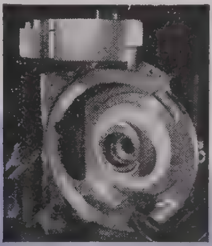
"the handiest Machine in the shop"

The machining of irregular shaped work can be expensive when set up on equipment with inherent limitations. Such work calls for the P&W Vertical Shaper — the machine that's in a class by itself for range of profitable application in the toolroom and in the die shop. For example . . .

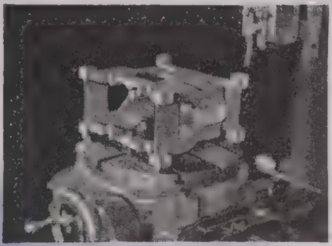




Large casting faced on both sides — without change in setup and without need for a special fixture.

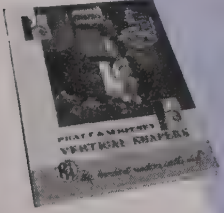


Three cylindrical surfaces machined to specifications, again without costly fixture.



All 35 slots and surfaces on both sides of this irregular-shaped box jig were machined without a change in setup.

Other methods required as much as 43 hours to machine the irregular contours of this die and die shoe. P&W Vertical Shaper finished the job in 8¼ hours.



This Bulletin describes the 6 inch and the 12 inch (illustrated) P&W Vertical Shaper's features for the profitable machining of all sorts of irregular-shaped work. It's yours for the asking — without obligation.

These illustrations are typical of the variety of work accomplished with characteristic Pratt & Whitney accuracy on the Vertical Shaper. Hard-to-reach surfaces, intricate shapes, odd bosses and slots, relief angles for dies — all are easily reached by the cutting tool, and are usually *machined without special fixtures or change of setup.*

The operator likes this machine because it simplifies his work; he finds the ordinarily difficult jobs easy to mount, to index, to observe, to control. Management likes it because it pays off in time-saving, accurate results. Without question, it's "the handiest machine in the shop."

Pratt & Whitney

Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

Vertical Shapers

Assembly Line . . .

WALTER G. PATTON

- **Chevrolet announces bonded brake linings will be used on its 1949 passenger cars and light trucks . . . Dodge introduces its '49 models . . . GMC cuts prices**

DETROIT—If you've been reading Dr. Seuss' delightful book, "Horton Hatches the Egg," to the kids lately, you will recall that Horton the elephant, after listening to much persuasive talk agrees to sit on the egg while the lazy Mayziebird takes off for an unearned vacation. Horton sits and he sits and he sits. He sits through rain and snow. He even sits out an ocean trip in which he gets "seasick 100 pct." Finally after 51 long weeks the egg hatches. It turns out to be something excitingly new—an elephant bird!

This week Chevrolet "hatched" a bonded brake lining it has been sitting on for more than 2 years. To be specific, the company first began sitting on its brake lining development more than 3 million brake shoes ago. Since 1947, it has installed bonded linings on light trucks. The 1949 passenger cars also have bonded linings, although this fact was not announced officially for weeks after the cars were first shown to the public in New York. Meanwhile, Chrysler Corp., which adopted bonded brake linings for its passenger cars this year, broadcast the fact more than a month in advance of showing its cars to the public.

An interesting fact about bonded brake linings is that this is another of those cases where two competing automobile companies have gone after the same objective but have arrived at their destination by two somewhat different routes. There are many examples of this in the motor industry — torque tube v. Hotchkiss drive; L-Head v. overhead Valves; Dynaflow v. Hydra-Matic transmissions, etc.

The Chrysler lining is bonded to the shoe by means of a special cement which Chrysler engineers have developed. Heat is applied in an oven. The cement is called "Cycleweld" and there are a number of applications other than bonding linings to brake shoes.

The Chevrolet process has very little, if anything, in common with the Cycleweld process. There are 14 distinct steps involved in the new process developed by Chevrolet. However, even ahead of the process itself are numerous control steps that are taken to fool-proof the operation. For instance, the tape used by Chevrolet to provide a bond is stored at 40°. It is delivered to the plant in refrigerated cars. Only a day's supply is removed from storage at a time and this tape is kept in a refrigerator until ready for use.

The first step in the Chevrolet manufacturing operation is to clean the components thoroughly. Linings are sprayed and coated with primer. They are air-dried while moving along a conveyer. Meanwhile, the shoe has been washed, rinsed, and dipped in solutions ranging from hot water to varnish.

Chemically-treated bonding tape was adopted, it is reported, because it assures uniform thickness of the bonding material. A specially designed machine is used to insert the tape between the shoe and the lining. The machine automatically separates the tape from its protective coating of paper and cuts it to proper size.

THE assembling fixture is designed so that a spring mechanism forces the lining surface outward against a retaining band. The assembly is then baked at temperatures up to 400° for approximately 56 min. Excess bonding material is removed after cooling.

Chevrolet visually inspects every shoe and tests every 1000th shoe in shear, applying a load of 4000 lb. According to available reports, the lining itself invariably gives way before the bond.

It has been predicted that the use of bonded brake linings will double brake life and eliminate drum scoring. In the case of riveted lining, brakes are good only until surfaces wear down even with the heads of the countersunk rivets. With the bonded lining almost the entire lining thickness is usable.

For the present, all lining-to-shoe bonding is being done at Chevrolet's Gear and Axle Div. in Detroit. For replacement, bonded brake assemblies are furnished to dealers.

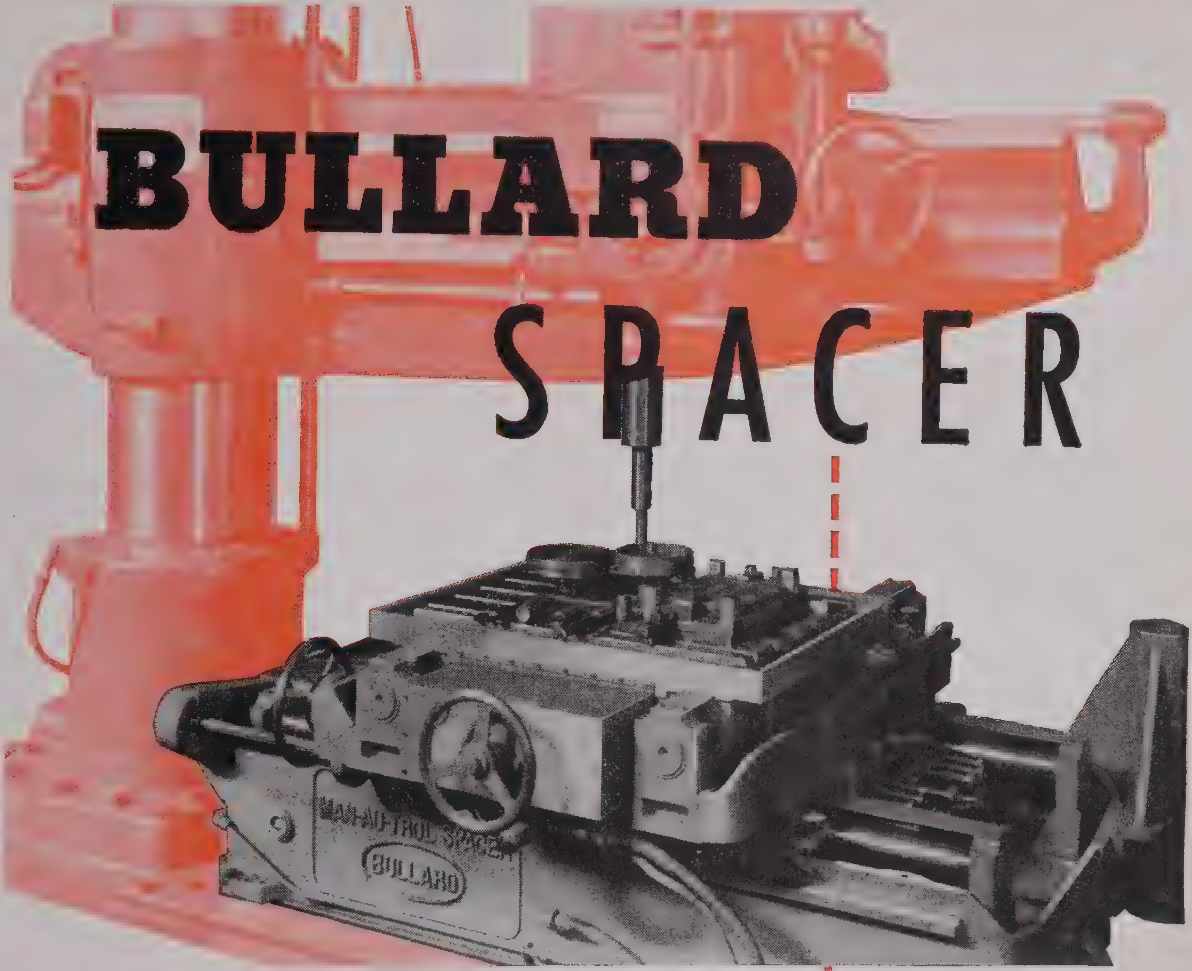
Most Detroit sources are now convinced that bonded brake linings will not only be extended to other passenger car lines but to the heavy trucking field as well. Riveted brake linings seem destined to join the long procession of processing methods which the auto industry is periodically throwing into the discard. As some observers now see it, the entire industry may be converted to bonded linings within 2 years.

* * *

THE process of announcing the birth of a new Chrysler car takes a considerable amount of time nowadays. Late in January (IRON AGE, Jan. 20, p. 78) the first details of the new cars were published. A week ago (IRON AGE, Feb. 24, p. 108) many of the engineering details were revealed. This week the first photographs of the new models were released.

Many of the engineering and construction details have already been described. Other pertinent infor-

BULLARD SPACER



ELIMINATES . . .

Hole-Locating Jigs and Fixtures

This unit applied to radial drills having accurate drill spindles, is proving a highly successful cost reducing method for drilling short or long run jobs without the need for expensive jigs or fixtures.

It is competitively accurate and in many cases faster than conventional jig borers.

Drilling, boring, reaming and tapping operations have been speeded up and costs reduced by many users of this equipment.

To meet the future economic pressure investigate this manufacturing method. Ask BULLARD Engineers about satisfied users. Write today.

Illustrated...
30 x 20 SPACER

— Bullard 30 x 20 Spacer processing three different parts in one set up. All pieces located within ± .0005. Such a set up is especially profitable on small lot production.

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

BULLARD

mation will be included in description of the new Dodge, introduced this week to the motoring public.

The new Dodge will be produced in 11 body styles and on two different wheelbases. Compression ratio of the engine is 7 to 1. Most of Dodge production, initially at least, will be the New Coronet and Meadowbrook models having a 123½ in. wheelbase. The new addition to the Dodge line is the Wayfarer with 115 in. wheelbase.

By lengthening the wheelbase 4 in. Dodge has cut down the overhang both in front and in the rear. Massive fender sections have been carefully avoided. Fenders are bolted on rather than being integral with the body.

Bumpers are "ridged" to give greater stiffness. Wrap-around ends of the rear bumpers are partially recessed into the rear fenders.

The headlight span has been increased 5¾ in. Deck lid lock, stop lights and license lights have been combined into a single unit. The license plate is recessed into the deck.

A decorative chromium-plated bar is attached to the back of the front seat of the Coronet sedan. The new 18 in. steering wheel is made of hard rubber with metallic enamel finish.

Front seats are 6 in. wider and the rear seat is nearly 8 in. wider. Headroom has been increased to 37 in. for both front and rear passengers.

The combination of a low contour line between the front fenders and the hood and "knee level" front seat height provides increased road and rear view vision.

As special equipment, Dodge is offering a warning signal attachment which flashes a map light if the handbrake is engaged when the ignition signal is turned on.

Cycle bonded brake linings are replacing the riveted linings previously used. Rear doors are hinged to the center post so they tend to swing closed when the car is moving.

HEIGHT of the car without load is 65½ in. The front seat is adjustable 5 in. forward and 1 in. vertical.

The "L" Head engine has floating power mountings and 3¼ in. bore x 4⅝ in. stroke. Other engineering features include full length jacketed cylinder bores, armored ignition cable, Hotchkiss type final drive and tubular propeller shaft.

The rear axle banjo-type housing is a steel stamping assembly. Hypoid bevel gears and axle shafts are made of Amola steel. The front suspension also uses Amola steel and the springs are matched and rustproofed.

The chassis frame is an improved box type with double-channel welded members. Side channels are 4¼ x 2¼ in.

Wheels are 15 in. disc type with 5 in. safety rims. Tires are 7.10 x15 low pressure super-cushion.

The new starter switch is operated by turning the ignition key slightly beyond the "ignition on" position.

Dodge's Gyro-Matic transmission permits semiautomatic operation by the driver. The driver starts with the gear lever in the high position. When sufficient forward speed is obtained, the driver lifts his foot from the accelerator momentarily and the car shifts into high. The accelerator may be depressed to the floor to shift into a lower "Sprint-away" gear. Fluid drive is retained.

For the first time in many years. Dodge is offering a station wagon. The new 115 in. Wayfarer line will include a 2-door sedan, a 3-passenger coupe and a new roadster with detachable side curtains.

GMC Cuts Auto Prices

Detroit

• • • **Competition** is back in the automobile industry.

Last week's announcement by GM of its first price cut since the war was as dramatic as it was unexpected. Coming hot on the heels of Chrysler's announcement of a 6.66 pct price boost, the announcement took a lot of bounce out of the Chrysler introduction and its record earnings. The price cuts range from $10 to $40, substantially less than the price increases made at the time of the new model announcements several months ago.

Since GM has been insisting for months that its cars are already lower in price than its competition, the cut will extend even further the advantage GM now has pricewise over many of its competitors. This is particularly true of the independent producers.

Timed to coincide with the downward adjustment of 2¢ per hr for 273,000 hourly rate employees and a $10 reduction quarterly for 68,000 eligible salaried personnel, the GM car price decrease has also forced a revision of labor's position for the coming negotiations.

While it is not expected that GM's competitors will act in hot haste to match the GM cuts, price reductions by other producers are almost certain to come in the next few weeks, as most local observers see the present situation.

Under the GM formula, wages and salaries of GM employees are adjusted to keep them in line with the Consumer price index of the U. S. Bureau of Labor Statistics. The index for Jan. 15 is 170.9 compared with the Oct. 15 figure of 173.6.

This is the third time the GM adjustment formula has been applied. In September 1948, the workers received an upward adjustment of 3¢ per hr, bringing their cost of living allowance to 8¢. In December no adjustment was required. This is the first time the GM workers have taken a cut under the wage adjustment formula. All GM employees get an automatic 3¢ upward adjustment on May 29 under the yearly improvement clause in the GM-UAW-CIO contract.

Chrysler Raises Prices

Detroit

• • • **Chrysler has raised prices** of its new models on an average 6.66 pct.

Price range for the Plymouth DeLuxe line is $1295 to $1465. The Special DeLuxe series ranges from $1515 to $1875.

The Dodge Wayfarer 3-passenger coupe is priced at $1525. The Dodge 4-door sedan is listed at $1750 and the Dodge Coronet series ranges from $1812 to $2206.

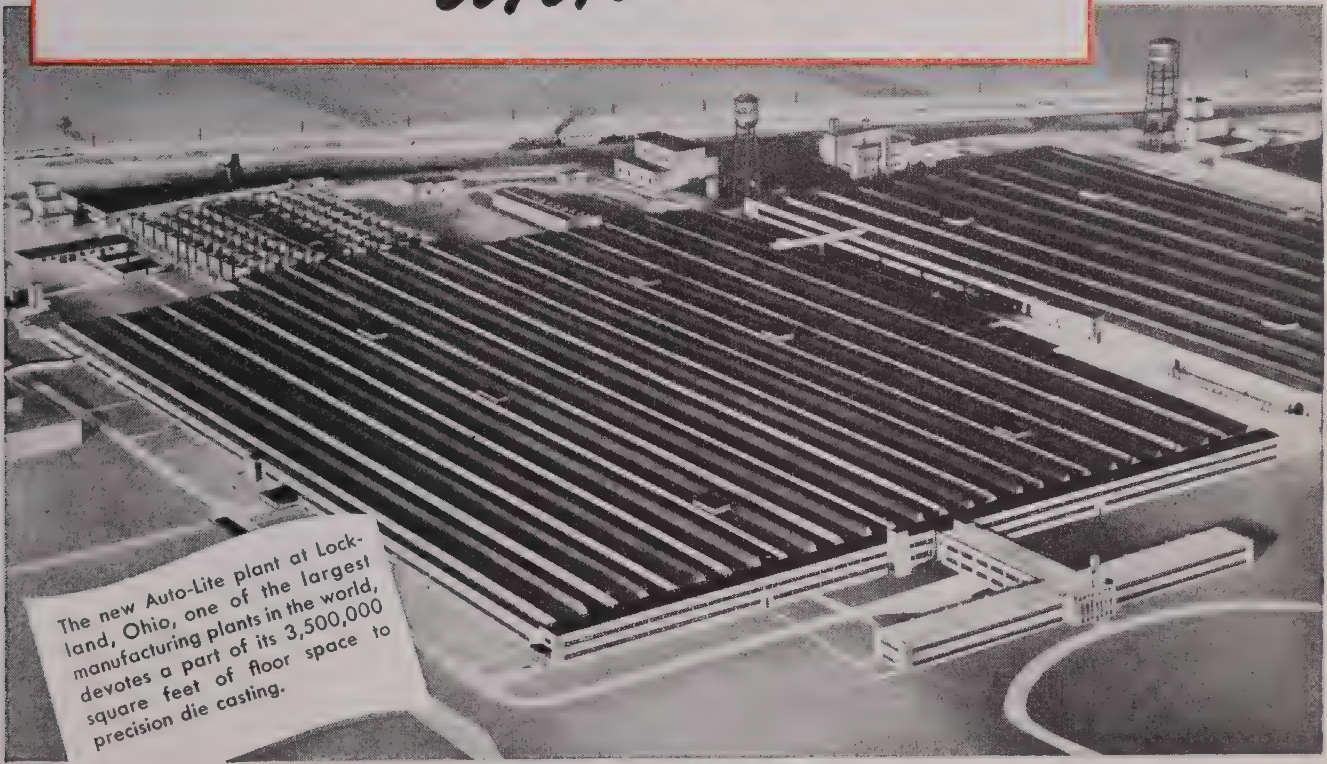
De Soto prices begin at $1871 and list up to $2443 for the Custom Convertible Coupe.

The Chrysler Royal price range is $2002 to $2021. Chrysler Windsor is priced from $2186 to $2598. The Saratoga price range is $2448 to $2473 and the Chrysler New Yorker lists from $2558 for the Club Coupe to $3039 for the Convertible Coupe.

These are factory retail prices, exclusive of taxes, at Detroit.

AUTO-LITE *announces . . .*

Tune in "Suspense!", Radio Adventure at its Greatest —Thursday, 9:00 P. M., E. S. T. on CBS



The new Auto-Lite plant at Lockland, Ohio, one of the largest manufacturing plants in the world, devotes a part of its 3,500,000 square feet of floor space to precision die casting.

Increased production facilities for

DIE CASTINGS

● Here is important news for everyone who has need of the accurate, reliable die castings made possible with the famous Auto-Lite "controlled metals" processes. The opening of the great new Lockland plant of Auto-Lite, combined with the enlarged facilities at Woodstock, Illinois, greatly increases Auto-Lite's ability to furnish the high quality die castings for which the Auto-Lite name is known wherever die castings are used. We invite your inquiries.

THE ELECTRIC AUTO-LITE COMPANY
Die Casting Division, Woodstock, Illinois

600 S. Michigan Avenue
Chicago 5, Illinois

723 New Center Bldg.
Detroit 2, Michigan

AUTO-LITE MEANS PRECISION MANUFACTURING

Washington . . .

EUGENE J. HARDY

• Administration economic bill a cure-all . . . Measure authorizes government establishment of production goals . . . Far-reaching powers would be recreated.

WASHINGTON—Current efforts of the planners in the Truman "Fair Deal" Administration bring to mind the story of the legendary highwayman Procrustes. This character, it will be remembered, tied his victims upon an iron bed, and as the case required, either stretched or cut off their legs to adapt them to its length.

So it is with the planners. Regardless of the economic climate the same old panaceas show up on Capitol Hill in administration sponsored legislation.

Take for example President Truman's oft-reiterated anti-inflation program, presented to the Congress most recently in the 1949 State of the Union message. With the weakening of inflationary pressures that has become evident for the past several months, anti-inflation talk has been soft-pedaled ever so slightly. But the legislative requests remain much the same, and are now contained in an administration backed bill (H. R. 2756), the "Economic Stability Act of 1949," rather than the "Anti-inflation Act of 1949."

In other words, this bill was supposedly designed to take care of inflation, deflation, dis-inflation, and perhaps even flation. It will assure an ever expanding economy with the federal government as overseer. Business risks will be eliminated to a large extent, for if you have the proper influence, the government will build your plant, allocate your material, set your prices, and feebly attempt to control the wages you pay.

FAR-FETCHED. Not at all. While there is not too great a likelihood that Congress will accept this program or any major portion of it, it is a dream come true for certain individuals in the government and a few members of Congress.

An analysis of the provisions of this cure-all reveals that at least a portion of the powers of a whole host of wartime agencies would be recreated and lodged in new agencies or delegated to existing departments of government. Included are the following: Foreign Economic Administration, Defense Plant Corp., War Production Board, Office of Price Administration, Price Decontrol Board, War Labor Board (this time, to be called Temporary Wage Board), Office of Contract Settlement, and the Smaller War Plants Corp.

In addition, enactment of this economic hodge-podge would extend the Office of Industry Cooperation and broaden the powers of the Reconstruction Finance Corp. and possibly the Bureau of Federal Supply. Surpervising all of these powers would be something like the Office of War Mobilization and Reconversion or perhaps the Office of Economic Stabilization, since the measure calls for the appointment of an assistant to the President, at $20,000 a year, to coordinate the program.

Perhaps the most significant section of the bill is that which authorizes the government, after determination of critical commodity shortages, to set forth "the quantity goals to which it is necessary and feasible to increase the supply within a specified period of time."

THE remainder of the measure is dedicated to the controls and other measures necessary to reach the quantity goals as determined by the government.

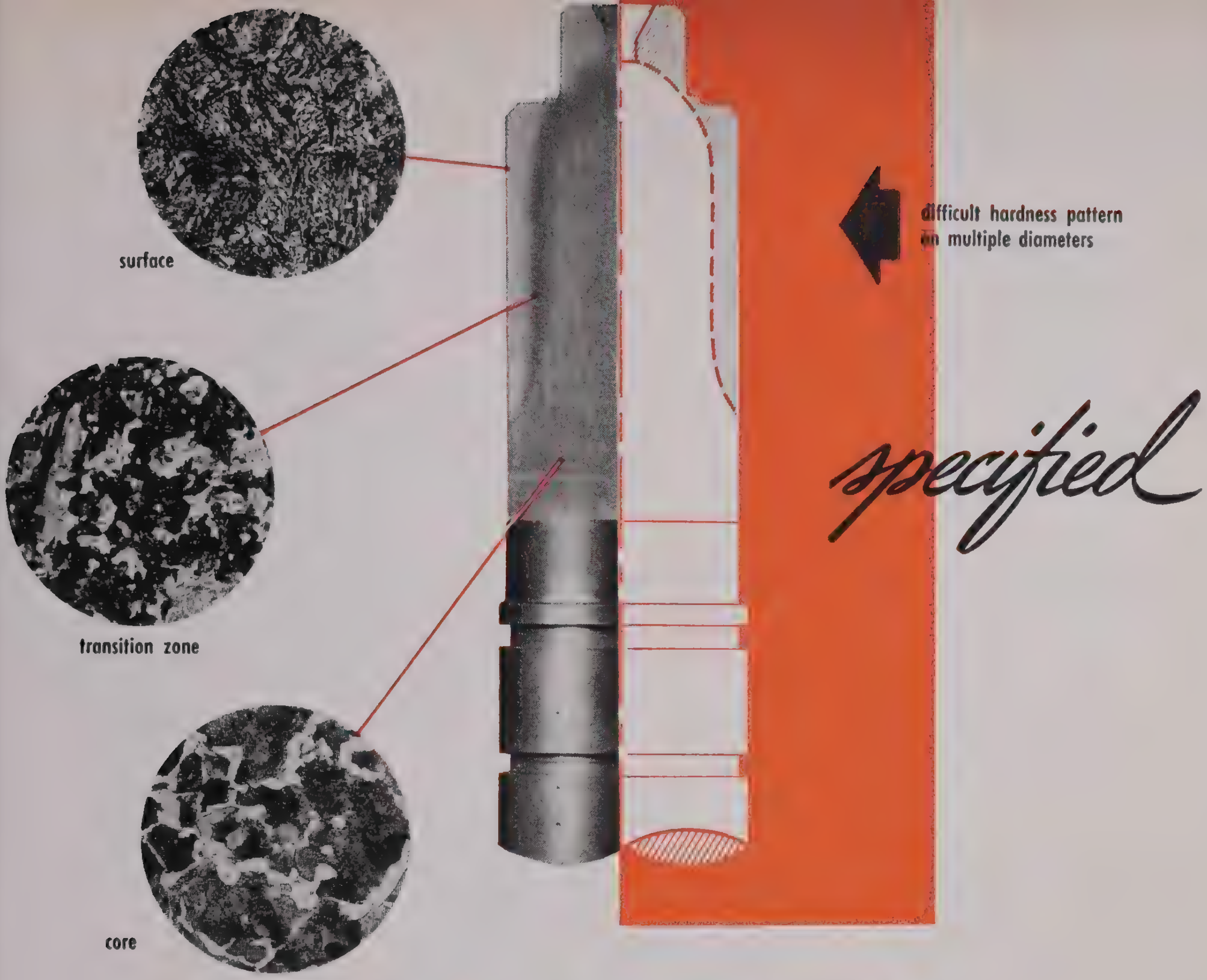
Taking the bill section by section it is found that among other things the government would be empowered to grant research and development contracts, including the construction and operation of pilot and demonstration plants, if deemed necessary to achieve these quantity goals. Powers would also be granted to enable the government to purchase raw materials abroad for government use or resale. Such purchases in the domestic market could be made only for government use for resale to fill government contracts.

Loans to private industry, state governments and subdivisions for the expansion of production and capacity are also authorized. Such loans could not exceed 75 pct of the "purchase price or construction costs." If the economic picture darkens, despite the panaceas contained in the bill, the government could reduce or defer payments of interest or principal or both.

If the loan features of the measure are not working to the satisfaction of the planners, the government could then step in to construct new plants or expand existing facilities.

ALL of this expansion would be carried out with a view to furthering the aims of the antitrust laws, to building up underdeveloped areas, and to dispersing industry in line with national security needs.

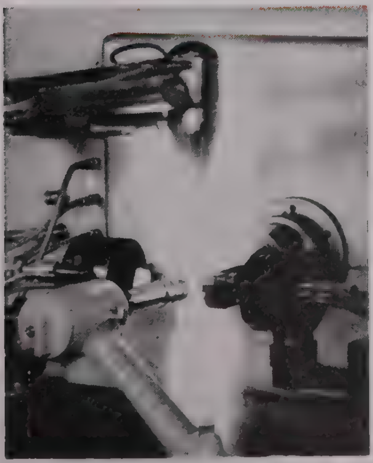
The bill also extends the existing voluntary allocations law and



achieved by **flamatic** selective surface hardening

. . .with electronic temperature control.
Compare this drawing of a hardness pattern for a drive shaft (above right) with the etched section of the actual part (above left) after Flamatic precision hardening. It is dramatic visual proof that Flamatic selectively hardened this part to the toughest sort of specifications.

But more important: the two diameters (pilot and splined portion) were hardened **in one operation** at the rate of 200 shafts per hour. Standard flame heads are arranged to concentrate the desired amounts of heat in the right areas. Hardening each diameter separately wouldn't do, for the second operation would alter the pattern produced by the first. This shaft, length 9-1/16″, pilot OD: 51/64″, spline OD: 1½″, SAE 4140 is one of fifty or more parts Flamatic-hardened by Rockford Clutch Division of Borg Warner Corp. Surfaces are heated to within plus or minus 5°F of preset values by exclusive electronic temperature control. Quick positive setups make small lot production convenient and economical. Adaptability to wide range of parts (gears up to 18″ and shafts up to 30″ long) makes Flamatic a profit-producing investment for scores of users. Write for informative booklet, Publication M-1658.



flamatic

THE CINCINNATI MILLING MACHINE CO.
Cincinnati 9, Ohio, U. S. A.

further provides for mandatory allocations and priorities.

The price control portions of the bill would require producers of commodities which significantly affect the cost of living to give 60 days' notice of intended price increases. Hearings would then be held to justify the proposed increases. If the government did not establish a maximum price during the 60-day period the increases would become effective. This would not preclude the establishment of price ceilings at a later date. Generally, the imposition of price ceilings would be limited to prices that have risen or threaten to rise after December 1948. Temporary price regulations could also be issued for a period not to exceed 90 days.

The wage control features apply only to wages in industries where price ceilings have been established. In such cases wage increases may be granted but the wage boost may not be used as a basis for price ceiling increases for a period of 6 months, unless the wage increase has been found necessary by the Temporary Wage Board for one of the following purposes: (1) to compensate for cost of living increases; (2) to correct wage inequities; (3) to correct substandards of living; or (4) to maintain essential production at levels certified by the President.

As to agricultural commodities, the measure prohibits the fixing of price ceilings below parity prices or comparable prices established by the Secretary of Agriculture. Significantly, the bill was drawn up by an administration group headed by the present Secretary of Agriculture, Charles Brannan.

•

Highway Construction Awards Decline More Than 5 Pct in '48

Washington

• • • **Highway construction** contract awards declined more than 5 pct in 1948 while the cost of road projects increased during the same period, Charles M. Upham, engineer-director of the American Road Builders' Assn., said recently.

"Figures of the Public Roads Administration indicate that 10,206 awards covering 40,115 miles of highway construction were made during 1948, as compared to 10,825 awards for 44,918 miles of highway construction during 1947," Mr. Upham said.

"Due to increased costs of materials and labor, however, the total cost of the 1948 contract awards was $1,165,379,000, or $260,528,000 higher than the total of the 1947 awards—$904,851,000," he added.

Pennsylvania continued to lead the rest of the states in 1948 in the total number of contract awards with 1115. She was also the leader in 1947 with 1429. Other top states in awarding highway construction contracts for the past year were Texas, 847; West Virginia, 527; Kansas, 456; Massachusetts, 449, and Iowa, 436.

The Keystone state also led the nation in cost of projects. Pennsylvania's contract award costs for highway construction totaled $118,734,000. The five other leaders were New York, $91,949,000; Texas, $70,799,000; California, $62,990,000; Ohio, $55,906,000, and Massachusetts, $37,569,000.

In mileage Texas was far ahead of other states in planning new construction of 4610 miles. Also high in mileage were: Ohio, 2684; Kansas, 2249; South Carolina, 1812; West Virginia, 1610, and Pennsylvania, 1519.

•

Studies Iron Ore Deposits In Essex County, N. Y.

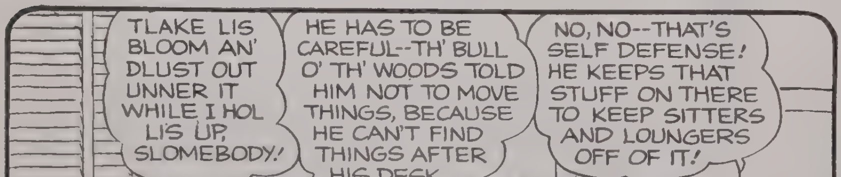
Washington

• • • **An investigation** of iron ore deposits in Essex County, N. Y., conducted by the Bureau of Mines in 1943 and 1944, is described in a recent project report by the bureau.

Between December 1943 and July 1944, the Bureau of Mines investigated the Broughton and Ring magnetic deposits by conducting a magnetometer and by core-drilling a hole 483 ft deep on the Ring property. No iron was intersected by the drill hole, the publication reports.

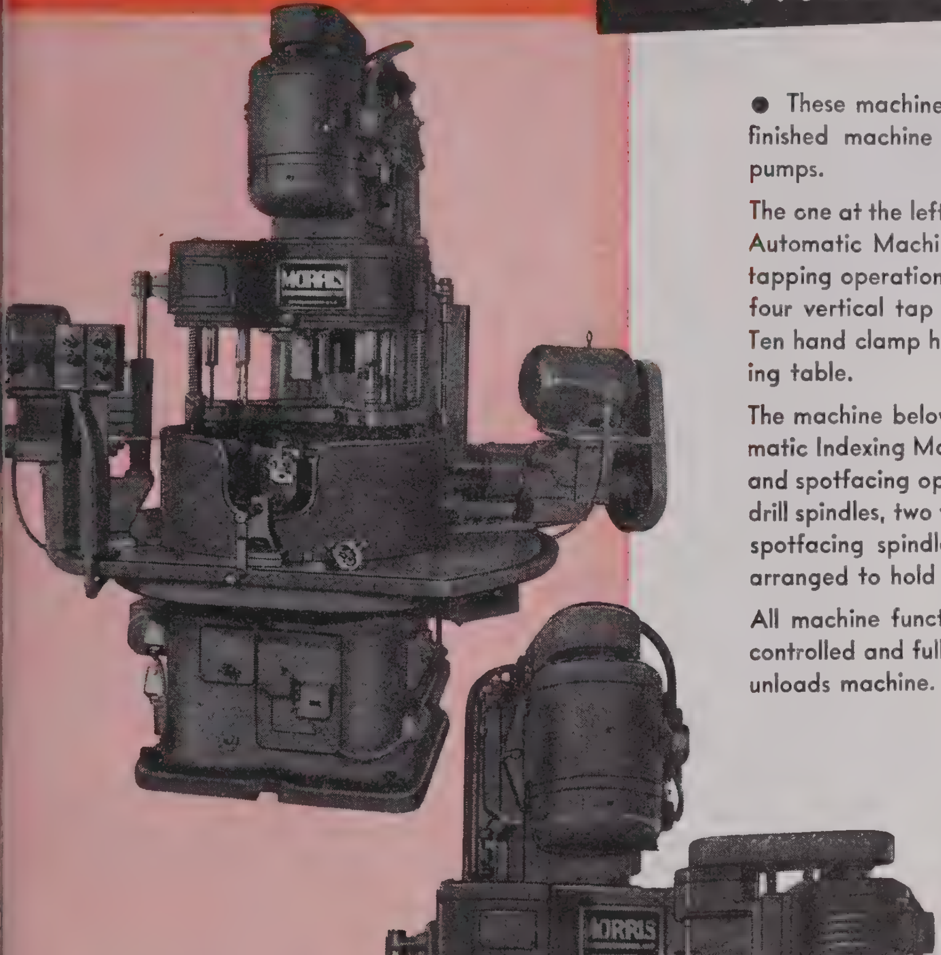
The areas studied are near the rich magnetite deposits of the Minesville area. Containing a graphic log of the drilling operations, the publication also deals with the physical features, history and geology of the properties.

THE BULL OF THE WOODS BY J. R. WILLIAMS


TLAKE LIS BLOOM AN' DLUST OUT UNNER IT WHILE I HOL LIS UP, SLOMEBODY!
HE HAS TO BE CAREFUL--TH' BULL O' TH' WOODS TOLD HIM NOT TO MOVE THINGS, BECAUSE HE CAN'T FIND THINGS AFTER HIS DESK IS TIDIED UP!
NO, NO--THAT'S SELF DEFENSE! HE KEEPS THAT STUFF ON THERE TO KEEP SITTERS AND LOUNGERS OFF OF IT!
T. M. REC. U. S. PAT. OFF. COPR. 1949 BY NEA SERVICE, INC.
COLD STORAGE
3-4 J.R.WILLIAMS

PULLING FOR HIGH PRODUCTION—

MORRIS MOR-SPEED Production Machines



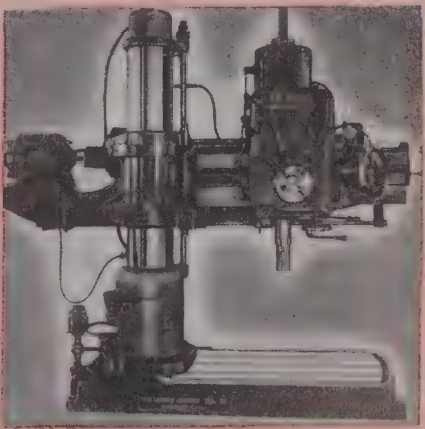
- These machines were designed and built for rough and finished machine operations on housings for automobile pumps.

The one at the left is a Morris Hydraulic Vertical 10-Station Automatic Machine for drilling, reaming, chamfering and tapping operations. It has twelve vertical drilling spindles—four vertical tap spindles and one horizontal drill spindle. Ten hand clamp holding fixtures are mounted on the indexing table.

The machine below is a Hydraulic Vertical 6-Station Automatic Indexing Machine for drilling, reaming, counterboring and spotfacing operations. It is equipped with four vertical drill spindles, two vertical reaming spindles and one vertical spotfacing spindle. Six hand clamp holding fixtures are arranged to hold the work.

All machine functions on both machines are hydraulically controlled and fully automatic—operator merely loads and unloads machine.

When your work requires multiple operations and high productivity consult Morris; they have the experience—engineering "know how"—and facilities to design — develop — and build high speed production equipment to meet your specific need. Write for details.



MORRIS MOR-SPEED RADIAL

Builders of MOR-SPEED Line

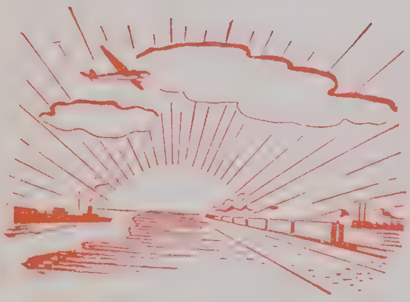
The MORRIS Machine Tool Co.

CINCINNATI 3, OHIO

West Coast . . .

ROBERT T. REINHARDT

• Slump in conversion ingot demand hits Coast producers . . . High cost of getting Alaskan scrap to mainland threatens imports . . . Nail market slides.



SEATTLE—Effect of cooling interest in conversion ingots among steel buyers is becoming increasingly apparent in the West as some furnaces are shut down and others put on reduced production.

Isaacson Iron Works here, which has enjoyed a high volume domestic and export business in ingots, is preparing to limit its electric furnace operations to its own need for forging ingots; Pacific States Steel Corp. in California has suspended operations of the government owned foundry furnaces at Pittsburg, Calif. from which it was casting ingots for shipment to eastern rollers; and Kaiser Co., Inc., which for a time was shipping heavy tonnages of ingots to the East, has curtailed this operation.

Isaacson has stopped all purchases of scrap metal, but still has contracts for ingots to complete, and is looking for additional ingot contracts. Company officials explain the stopping of scrap purchases by stating that the firm has an ample supply on hand to meet its present needs and as scrap prices are falling they can see no point in increasing inventories at this time.

This company is in a fortunate position to swing with the tide of business so far as shutting down or continuing operations is concerned. Its plant No. 2, including buildings, equipment and two electric furnaces of 10-ton capacity each, are owned by the U. S. Navy and leased to Isaacson on a tonnage basis. The company owns only the property and hence if a shutdown of operations becomes necessary through lack of demand for conversion ingots, the company will not be saddled with the depreciation costs of equipment and will stand to lose only possible profit.

With the conversion business in its present critical stage the firm has found it necessary to lay off some of its furnace men and to curtail some furnace operations. If a shutdown does occur more than 150 persons will be put out of work.

During the war, Isaacson turned out approximately 70 pct of all the country's Liberty and Victory ships' propeller shaftings, and since the war it has had a good export and domestic business, having sold more than 80,000 tons of ingots to Italy and England and a lesser amount to other foreign countries. As company officials state, present contracts for ingots are nearing their end, but there are still prospects of getting other orders and whether the shutdown occurs will depend upon receipt of those orders.

Isaacson has two 40-ton electric furnaces of its own with an annual rated capacity of approximately 104,000 tons which can normally supply this company's demands for forging material.

DISCONTINUANCE of operations at the government-owned Pittsburg, Calif. foundry by Pacific States Steel Corp. came about because of a drop in demand for conversion ingots. Once more this well equipped foundry stands idle and the WAA has as yet found no bidders for it. Twice invitations to bid have been extended without response.

Ironically, the power shortage in the Northwest which has handicapped Isaacson's electric furnace operations is just about ended. Both City Light and Puget Sound Power & Light Co. officials announced this week that unless another spell of winter weather clamped down over the Northwest the conservation of power during peak hours is no longer necessary. Some industries—particularly aluminum—will be under some restraint for a little while longer, but authorities believe the worst of the shortage is ended for this year.

•

Geneva Back to Par

Salt Lake City

• • • **All three** blast furnaces at the Geneva steel plant are operating at normal capacity following a small cutback 2 weeks ago because of dwindling iron ore supplies. Blizzards blocked the rail line from the Cedar City mines curtailing ore shipments for several days.

•

Completes Alterations

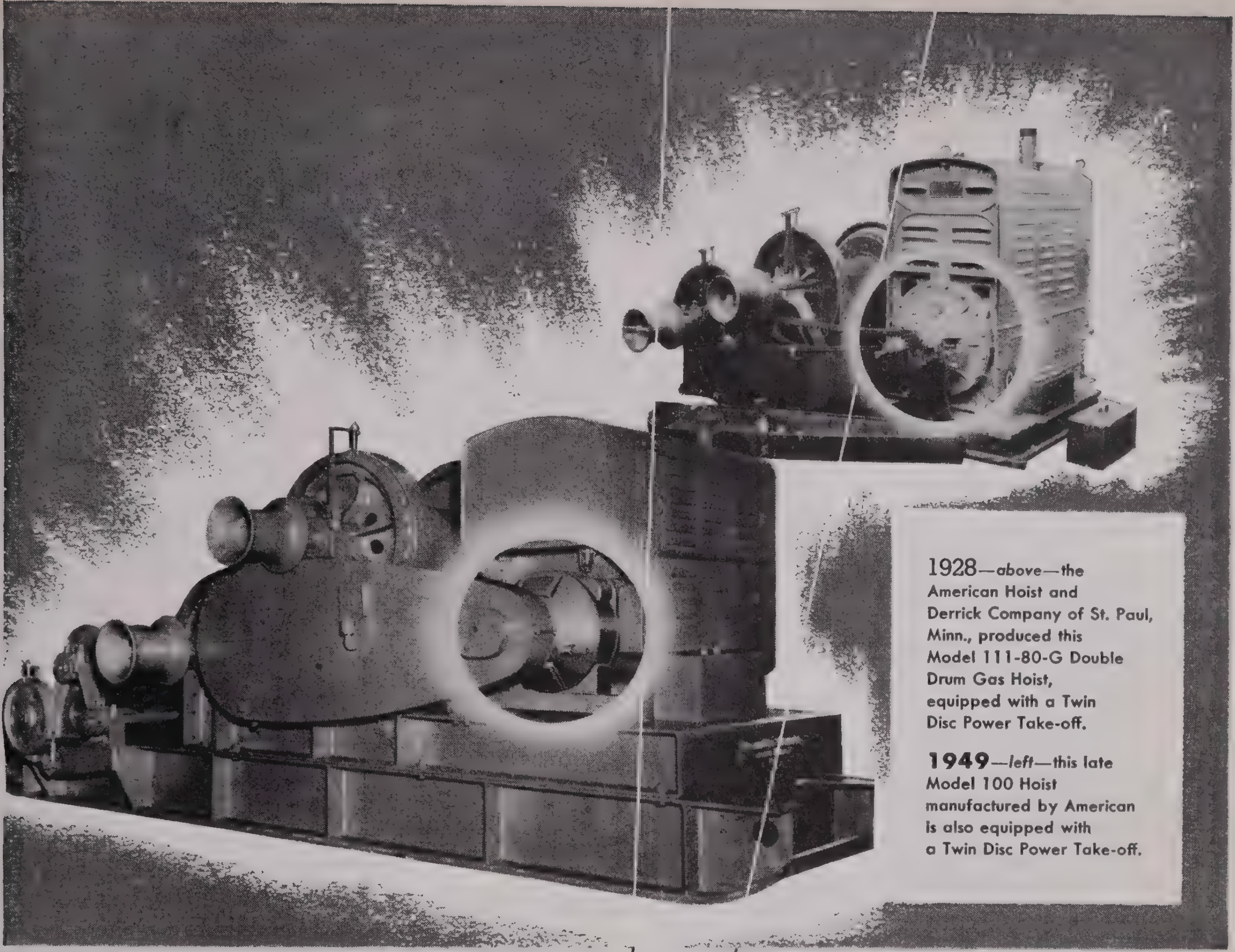
Los Angeles

• • • **Bringing another** company into the field, the Malleable Fittings Corp. is completing alterations which will make it the second largest malleable foundry in southern California.

General Metals, the largest malleable foundry in the area, recently announced that it has an expansion and mechanization program under way.

Although other foundry business remains slow, the malleable foundry prospects in the area appear better than average.

Malleable Fittings Corp. in Wilmington, Calif. has taken over the former Maritime Brass & Bronze plant and is expanding and



1928—*above*—the American Hoist and Derrick Company of St. Paul, Minn., produced this Model 111-80-G Double Drum Gas Hoist, equipped with a Twin Disc Power Take-off.

1949—*left*—this late Model 100 Hoist manufactured by American is also equipped with a Twin Disc Power Take-off.

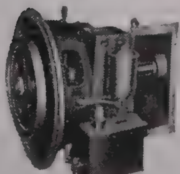
21 Years Service with American Hoist

In 1928, the American Hoist and Derrick Company installed a Twin Disc Power Take-off on its new Double Drum Gas Hoist. It marked the beginning of 21 years of Twin Disc service to the St. Paul manufacturer, for Twin Disc still provides efficient power transmission units on American Hoist's 1949 equipment.

For more than 30 years, the Twin Disc Clutch Company has specialized in power transmission problems. In the logging industry . . . as well as in the construction, petroleum, marine, machine tool and implement industries . . . manufacturers find Twin Disc Power Take-offs, Friction Clutches, Marine Gears and Hydraulic Drives efficient, long-wearing power transmission units. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

Heavy Duty Clutch

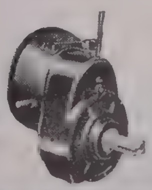
Hydraulic Torque Converter



Hydraulic Coupling

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U.S. PAT. OFF.

Reduction Gear



Marine Gear

JUDGE TWIN DISC BY THE COMPANIES IT KEEPS

mechanizing it. It will deal strictly in malleables, making mainly pipe fittings up to 1½ in. size. Galvanizing equipment is being installed.

Operations, which probably will begin early in April, will find the foundry producing approximately 300 tons of finished castings a month, according to Irving Terry, president. There will be 150 men employed. The plant covers 35,000 sq ft.

Claims Steel Shortage Hurts

Los Angeles

• • • **Steel shortages** are keeping the El Segundo assembly plant of the Nash Motors Co. operating at only 50 pct of capacity, R. A. DeVlieg, vice-president in charge of manufacturing, reported during a recent inspection tour of the new works here.

"Future planning calls for production from the El Segundo plant of a sufficient number of cars to meet requirements in five western states," Mr. DeVlieg said.

Nearby, Studebaker resorted to unusual methods to keep its assembly line moving when snow delayed the movement of parts by rail. In "operation Studebaker" a flying freight car from United Air Lines was employed to carry a load of nearly 500 fenders from South Bend, Ind., to here.

Through the air lift, the assembly plant was able to maintain its newly established pace of 136 cars a day, an increase over the 96 turned out daily last year.

Studebaker employs 1100 in the assembly plant.

Marks Time on Fertilizer

Salt Lake City

• • • **J. R. Simplot** Co. is still marking time on conversion of the war surplus Kalunite plant here to the production of fertilizer. Whether the plant can be used for this purpose, for which it was purchased from the government, will depend upon a ruling of the U. S. Dept. of Commerce Appeals Board as to the eligibility of the Simplot firm to purchase anhydrous ammonia from the Army.

The Secretary of Commerce has held that the firm has no priority. Simplot asked for a reversal by the Appeals Board, with the backing of members of the Utah and Oregon congressional delegations and the Salt Lake Chamber of Commerce. Simplot and his supporters take the position that his priority for surplus ammonia should be superior to those of foreign countries, which are receiving large quantities of the material from the Army.

The company has already made a substantial investment in remodeling the plant and is prepared to start production whenever the ammonia is made available.

To Start New Building

Portland, Ore.

• • • **Schmitt Steel Co.** will begin construction of a new steel building at a cost of approximately $40,000 at the site of a wooden frame structure which was destroyed by fire last June. A portion of the structure will be devoted to steel fabrication and another to a forge shop.

Ryan Aeronautical Net Up

San Diego

• • • **Ryan Aeronautical** Co. has reported a net profit of $356,603 in net sales of $7,948,411 during the fiscal year ending last Oct. 31. This is equal to 90¢ a share on the 393,650 shares of common stock outstanding and compares with a loss of $127,660 for the previous year when the company reported sales of $8,015,706.

Claude T. Ryan, president, revealed in the annual report that the company's backlog at the end of the last fiscal year was $11,700,000 and that on Dec. 31, 1947 the backlog was $4,731,349. Military contracts for a jet propelled, pilotless target airplane, and guided missile experiments constitute the bulk of this reserve. Navion production is being scheduled to meet market demands because of seasonal trends although 500 commercial Navions were sold last year.

American Brass to Build

Los Angeles

• • • **American Brass Co.** has purchased a 45 acre tract here for the construction of a multimillion dollar plant. A. H. Quigley, company president, states that details on plant construction are not available yet, but that products to be produced will probably include sheets, wire, rods and tubes. Tentative plans indicate that this will be one of the largest industrial plants to be erected in the Los Angeles area since the end of the war.

Industrial Pow Wow Called

Boise, Idaho

• • • **A general** meeting of the Western States Council is scheduled to be held here Mar. 28 and 29 with approximately 150 industrialists and chambers of commerce executives in attendance. Included in the program will be a report by J. R. Mahoney, University of Utah, on the natural resources of the West, and possibly a discussion of Bureau of Reclamation projects now under consideration. Tentatively scheduled for a panel on the fuel and energy resources of the West is Bert Manley, manager of the Utah Coal Operators Assn. Dr. Nathaniel Engle is scheduled to head a session in which the abolishment of the basing point price system will be discussed and Dr. Wilson Compton, president of Washington State College, will be one of the other featured speakers.

An effort will be made to determine whether an all-out industrial conference for western industrialists is desired.

Nails Easier; Imports Down

San Francisco

• • • **Decreasing** demand for common nails has brought the import business on this commodity into the doldrums.

A local company importing nails from Belgium reports that whereas a year ago they could sell about all they could get at approximately 25 pct above the domestic price, today they can find no buyers even with reduced prices which are still somewhat above local prices.

This importer reports that last year demand was steady from large contractors who found no fault with the quality of the nails which have a special type head which resists breakage. If demand warrants, this importer reports that he could get 400 tons of nails per month.

INGERSOLL PROCESS MACHINES

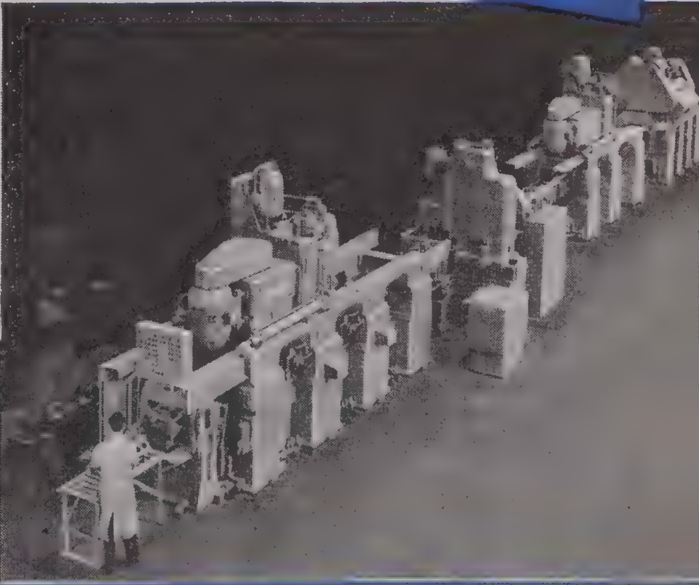
For Reducing the MAN HOURS per piece

Another COST-CUTTING Application of VICKERS HYDRAULICS

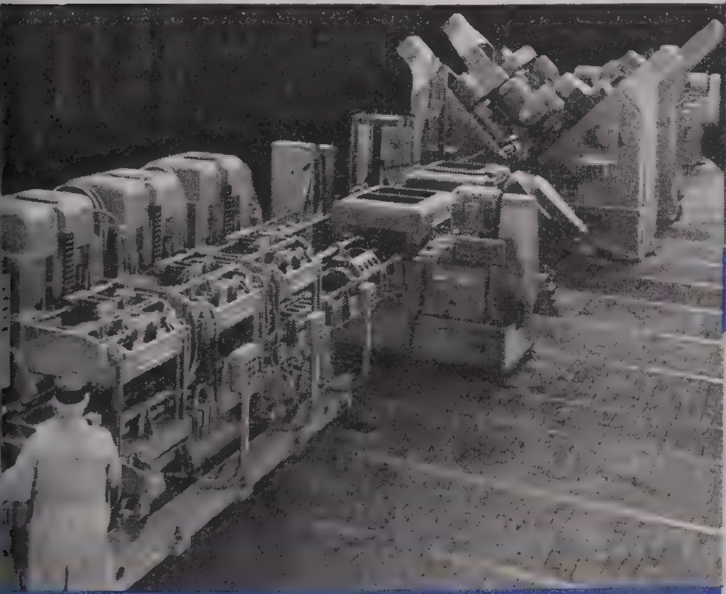
The two Ingersoll Process Machines illustrated here are being used for completely machining automobile cylinder blocks . . . they provide the extreme precision required and at the same time reduce the cost. It is significant that Ingersoll selected Vickers Hydraulic Controls for the many operations that can best be done with hydraulics.

Progression of the blocks through the machines is accomplished automatically, the time-saving transfer mechanisms being hydraulically actuated. Hydraulic circuits of the individual units provide for correct sequential positioning, clamping, traversing, feeding and returning. Interlocks assure accurate positioning, secure clamping and removal of interfering transfer members before cutting operations begin . . . also clearance of all cutters before transfer to next station can take place. Objectionable deflection is prevented by limiting the clamping pressure.

Get in touch with the nearest Vickers Application Engineering Office for information on how Vickers Hydraulics can improve your products.



Ingersoll 9-Station Process Machine has Vickers Hydraulic Controls to help secure extreme precision in cylinder blocks at lowest cost.

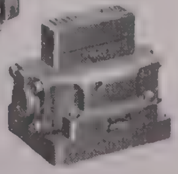


Ingersoll 11-Station Process Machine receives cylinder blocks from machine at right and similarly has Vickers Hydraulic Controls.

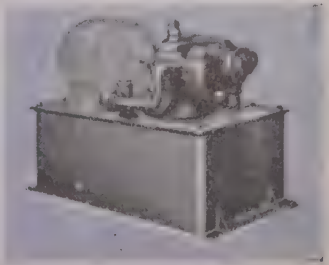
Representative VICKERS HYDRAULIC CONTROL UNITS USED ON INGERSOLL PROCESS MACHINES

Pressure Controls, Bulletin 45-34a

Flow Control
Valve,
Bulletin 45-35



4-Way Valve, Pilot Operated,
Solenoid Controlled, Bulletin 48-27



Power Unit, Bulletin 46-43a

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

PERSONALS

• **Leslie McArthur,** vice-president since 1948, has been elected a member of the board of directors of Niles-Bement-Pond Co., West Hartford. Mr. McArthur has been a member of the Niles organization since 1947.

• **H. H. Mosher** has been named manager, carbide sales, Detroit district, Firth Sterling Steel & Carbide Corp., McKeesport, Pa. He had previously served as manager of the former Firth Sterling Buffalo district. Mr. Mosher has been closely associated with the tool and die industries for nearly 17 years.

• **Eugene G. Sheasby** has been appointed general staff manager, general sales division, U. S. Steel Supply Co., Chicago. Mr. Sheasby formerly served as manager of the market development division.

• **Vincent A. Schmidt,** since 1940 production manager, Baker Bros., Inc., Toledo, has joined Nelson Stud Welding Div., Morton-Gregory Corp., Lorain, Ohio, serving as field engineer in the northwestern and central Ohio and northeastern Indiana districts. He has his headquarters at Morton Gregory's offices in Toledo.

• **William J. Kaiser** has been elected vice-president of Commercial Controls Corp., Rochester, N. Y.

• **Robert F. Smith** has been named vice-president and general manager of Indiana Steel Products Co., Chicago. **Frank A. Hayden** has been elected vice-president and succeeds Mr. Smith as sales manager in Chicago.

• **Frederick D. Keeler** has been appointed sales manager of the rolling mill division of Plume & Atwood Mfg. Co., Waterbury. Mr. Keeler joined Plume & Atwood last year, serving in an executive sales capacity. **Anthony T. Cole** has also joined the sales force of the rolling mill division, representing the company in the New York area.

• **James F. Ednie** has joined National Carbide Die Co., Elizabeth, Pa., and subsidiary, the Penn Carbide & Alloy Casting Co., as sales manager. Mr. Ednie had formerly been chief metallurgist for the Duquesne Smelting Corp.

• **William N. Brown** has been appointed Chicago district purchasing agent, American Steel & Wire Co., Cleveland, succeeding **I. E. Bowen,** who has been named assistant to the purchasing agent, continuing to maintain his headquarters in Chicago. Mr. Brown has been associated with the Wire company since 1942. Mr. Bowen joined the firm in 1899.

JAMES W. MURRAY, president and director, Murray Steel Supply Corp.

• **James W. Murray** has been made president and director of Murray Steel Supply Corp., New York. Mr. Murray had been associated with Jones & Laughlin Steel Corp. in New York since 1936.

• **E. A. Correa** has been elected secretary of Armco Steel Corp., Middletown, Ohio. Mr. Correa continues to serve as legal counsel for the company. He succeeds **W. D. Vorhis,** who has retired as secretary.

• **John M. Floyd,** vice-president in charge of manufacturing, A. O. Smith Corp., has been elected a director of Briggs & Stratton Corp., Milwaukee.

• **L. G. Jessup** has been appointed sales engineer and foundry adviser, Western Metal Co., Chicago. Mr. Jessup had formerly been associated with the Federated Metals Div., American Smelting & Refining Co.

• **Robert H. Askren** has been named business director of Robert Sidney Dickens & Associates, Chicago.

• **John I. Dean** has been appointed assistant to the sales manager of Porter Cable Machine Co., Syracuse. Mr. Dean had formerly been director of sales research for Sterling Tool Products Co., Chicago.

• **Emory Johnson** and **Louis Siegel** have been named assistant sales managers for Levinson Steel Sales Co., Pittsburgh.

• **Bernard R. Better** has been appointed director of research, Scully Jones & Co., Chicago. Mr. Better has been associated with the company since 1939.

• **Roy E. Jones** has been appointed export manager of Link-Belt Co., with headquarters in New York, succeeding **Carl A. Woerwag,** who has retired. Mr. Jones started with Link-Belt at the Philadelphia plant in 1927 and was made assistant export manager in 1944.

• **David Lyle** has been promoted to vice-president, engineering, Continental Foundry & Machine Co., E. Chicago, Ind., and **F. B. Streine** to assistant vice-president, engineering, sales, rolling mill and heavy machinery. Both men have been connected with the company for some time and continue to be located in the Pittsburgh sales and engineering offices.

• **Warren S. Marshall** has been named manager of railroad sales for Chicago Steel Service Co. Active in the steel warehousing business for 27 years, Mr. Marshall joined Chicago Steel Service in 1947 as a sales engineer. **F. C. Kemmerling** has been appointed office manager of the company.

• **F. K. Donaldson** has resigned as president of Machined Steel Castings Co., Alliance, Ohio.

THE MODERN
ELECTRIC RESISTANCE
WELDED STEEL TUBING...

Michigan WELDED STEEL TUBING

ROUND

¼" to 4" O.D. 9 to 22 gauge

SQUARE-RECTANGULAR

½" to 2" 20 gauge 1" to 2¾", 14, 16, 18 gauge

Standard Sizes

Tube Diameter O.D. Size	Maximum Wall BWG Decimal	Maximum Wall BWG Gauge	Minimum Wall BWG Decimal	Minimum Wall BWG Gauge
¼	.049	18	.028	22
⅜	.065	16	.022	24
½	.083	14	.022	24
⅝	.095	13	.022	24
¾	.095	13	.022	24
⅞	.095	13	.022	24
1	.095	13	.028	22
1⅛	.095	13	.028	22
1¼	.095	13	.028	22
1⅜	.095	13	.028	22
1½	.095	13	.035	20
1⅝	.120	11	.035	20
1¾	.120	11	.035	20
1⅞	.120	11	.035	20
2	.148	9	.035	20
2⅛	.148	9	.035	20
2¼	.148	9	.035	20
2⅜	.120	11	.035	20
2½	.148	9	.035	20
2⅝	.120	11	.035	20
2¾	.148	9	.035	20
2⅞	.148	9	.049	18
3	.148	9	.049	18
3⅛	.148	9	.049	18
3¼	.148	9	.049	18
3⅜	.148	9	.049	18
3½	.148	9	.049	18
3⅝	.148	9	.065	16
3¾	.148	9	.065	16
3⅞	.148	9	.065	16
4	.148	9	.065	16

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BEADED, ROLLED, EXTERNAL UPSET, INTERNAL UPSET,
SPUN CLOSED, FORGED, BEVEL FLANGED,
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MILES K. SMITH, vice-president and technical director, Jessop Steel Co.

• **Miles K. Smith** has been appointed vice-president and technical director, Jessop Steel Co., Washington, Pa. He had formerly been associated with the Molybdenum Corp. of America in a technical sales capacity and prior to that had been employed for many years by the Latrobe Electric Steel Co.

• **Russell F. Stuart** has been appointed sales manager for the Walker-Turner division in Plainfield, N. J., Kearney & Trecker Corp., Milwaukee. Mr. Stuart has been associated with Kearney & Trecker since 1923. For the past 13 years he has been head of the company's eastern U. S. sales activities.

• **Herbert W. Widdop** has been named sales manager of the Synthane Corp., Oaks, Pa., succeeding **J. B. Rittenhouse,** who died. **Eldridge E. Smith,** formerly in charge of the company's Philadelphia sales territory, has been appointed assistant sales manager. Mr. Widdop has been with Synthane 16 years and became assistant sales manager three years ago. Mr. Smith has been with the company nearly nine years.

• **Fred Williamson** has been appointed regional sales manager for Crosley Motors in Ohio. Mr. Williamson has his headquarters in Cincinnati.

• **E. M. Baker,** formerly manager of the hourly personnel department, has been named manager of the newly-established industrial relations department for the Rouge automotive operations of Ford Motor Co., Dearborn. **Clarence C. Donovan** has been named supervisor of labor relations in the new department. **Charles Columbus** has been appointed supervisor of hourly personnel; **Kenneth A. Dunn,** supervisor of salaried personnel; **Joseph E. Patten,** supervisor of plant protection; **W. M. Heston, Jr.,** supervisor of employee services; **Dr. Harley L. Krieger,** supervisor of medical services.

• **John R. Lewis** has been appointed manager of district No. 2 of the sales organization of Quaker Rubber Corp., Philadelphia. He had formerly served as assistant to the general sales manager of the corporation.

• **Raymond P. Russell** has been named manager of the Boston district of the industrial products sales department of B. F. Goodrich Co., succeeding John M. Cooney. Mr. Russell joined Goodrich in 1929 and had previously served as sales supervisor in the industrial products, Boston district. **William A. Schaub** has been appointed manager of the Denver district of the industrial sales. Mr. Schaub has been with the company since 1918 and has been an industrial products salesman in the Kansas City district for the last 24 years.

• **A. Ritchie Sawers,** of Chesley & Co., has been elected a director of Benton Harbor Malleable Industries, Benton Harbor, Mich.

• **George A. Grantham** has been appointed chief tool engineer of Weddell Tools, Inc., Rochester, N. Y. Mr. Grantham had previously served as assistant to the managing director of Richard Lloyd, Ltd., in England.

• **Leo E. Gatzek** has been appointed district manager for the Chicago territory including Illinois, Wisconsin, Missouri and western Indiana for the Ceilcote Co., Cleveland. Mr. Gatzek had formerly been with the manufacturing research division of International Harvester Co.

RALPH W. MASSEY, district sales manager Superior Steel Corp.

• **Ralph W. Massey** has been named Pittsburgh district sales manager, Superior Steel Corp., Carnegie, Pa., succeeding Fred L. Fox. Mr. Massey has been with Superior since 1938 in its New York and New England sales offices.

• **Melvin M. Johnson, Jr.,** has become associated with Winchester Repeating Arms Co., division of Olin Industries, Inc., New Haven. Mr. Johnson has served as president and technical director of Johnson Automatics, Inc., Boston, since 1938.

• **O. W. Young** has been named executive assistant to the general manager of Buick Motors Div., General Motors Corp., Flint. **E. T. Ragsdale,** formerly assistant chief engineer, has been named general manufacturing manager, succeeding Mr. Young. **Harry C. Doane** and **Richard C. Cook** have been appointed assistant chief engineers, the former in charge of the design divisions, production engineering and the drafting divisions and the latter in charge of experimental manufacturing, experimental tests and special projects. Mr. Young joined Buick in 1907. Mr. Ragsdale came to Buick 30 years ago. Mr. Doane became associated with General Motors in 1917. Mr. Cook joined the Chevrolet division as an inspector in 1933 and became staff engineer at Buick in 1946.

RAY S. LARSEN, sales manager, Despatch Oven Co.

• **Ray S. Larsen** has been appointed sales manager of the Despatch Oven Co., Minneapolis. Mr. Larsen joined Despatch in 1937 as a sales engineer. Previous to his new appointment he had charge of standard costs and methods engineering.

• **Wilson W. Wheeler** has been appointed sales manager, Askania Regulator Co., Chicago. Mr. Wheeler joined Askania in 1941 in the sales engineering department and in 1945 became head of that department. Prior to his association with Askania, Mr. Wheeler had been engaged as mechanical engineering consultant in Cincinnati.

• **Durward G. Hoffman** has been named comptroller of the Cleveland branch of National Lead Co., New York, succeeding **Edward W. Benson.** Mr. Hoffman had been with the company since 1937 and had been acting assistant comptroller of the Cleveland branch at the time of his new appointment. **Philip W. Ruppert** has been appointed assistant manager of the Chicago branch. He joined the company in 1929 and had served in the metal sales department previous to his new appointment.

• **Henry J. Stephens** and **John Woodward** have been elected directors of Wheaton Engineering Corp., manufacturers of solenoid valves.

• **John J. Meadows** has joined Sam Tour & Co., Inc., New York, supervising the reorganization of the mechanical engineering department of that company. Mr. Meadows has had 30 years' experience in electrical and mechanical engineering and is well-known in military, naval and engineering circles. He has served on the staffs of the Otis Elevator Co., the Board of Transportation and the engineering department of the New York Central Railroad.

• **Arnold Kaiander** has been elected president; **Steven Coloske** and **Oliver Laszlo,** vice-presidents, and **Stanley Czarnik,** secretary and treasurer, Abdite Gauge Co., Dearborn.

• **Henry C. McCaslin** has been appointed general purchasing agent of Willys-Overland Motors, Toledo. **Wesley H. Lowell** has been named purchasing agent in charge of raw materials; **Thomas O. MacDonald,** purchasing agent in charge of castings, forgings, patterns and dies; **George H. Kraus,** assistant to the director of procurement. Mr. McCaslin formerly served as vice-president in charge of engineering for the Kaiser-Frazer Corp. Mr. Lowell had formerly been identified with American Steel & Wire Co. as priorities representative and planning engineer. Mr. MacDonald had been a buyer for the Massey-Harris Tank division before joining Willys-Overland in 1944. Mr. Kraus joined Willys-Overland in 1947.

• **Richard O. White** has been named superintendent of the warehouse and packaging plant at Cornwells Heights, Pa., of the Pennsylvania Salt Mfg. Co., Philadelphia. Mr. White joined the company in 1945 and previous to his new appointment served as area supervisor at the Wyandotte, Mich., plant. **Robert E. Stewart** has been assigned to territorial responsibilities in the Chicago area for Pennsalt. He joined the company in 1948 as salesman in the special chemicals division.

• **E. L. Hemingway** has left the employ of the Gisholt Machine Co., Madison, Wis., where he served as research engineer. He had previously been associated with International Detrola Corp. as chief metallurgist.

HUBERT C. SWETT, assistant general superintendent, Los Angeles plant, Bethlehem Pacific Coast Steel Corp.

• **Hubert C. Swett** has been made assistant general superintendent, Los Angeles plant, Bethlehem Pacific Coast Steel Corp. Mr. Swett had formerly been employed at the company's South San Francisco plant as engineer of tests, which position he held since 1943.

• **James D. Russell** has been advanced to sales manager and **Leonard R. Shorek** to chief engineer of Young Bros. Co., Detroit. Both men have been associated with the company in other capacities for several years.

• **Thomas H. Daugherty** has been named assistant director of research for Calgon, Inc., Pittsburgh. **C. E. Kaufman** has been appointed assistant director of chemical research, Hall Laboratories, Inc.

• **Harry G. Haynes,** formerly vice-president and sales manager of the Restonic Corp., Toronto, Ontario, Canada, has been appointed field sales manager of the reclining chair division of the Barcalo Mfg. Co., Buffalo.

• **John C. Alberts** has been appointed factory sales representative of the Machine Div., Osborn Mfg. Co., Cleveland, assigned to the northern Indiana, Illinois, Iowa, Wisconsin and Minnesota area, with his headquarters in Osborn's Chicago office.

C. J. FORBES, assistant director industrial relations-research, American Steel & Wire Co.

• **C. J. Forbes** has been appointed assistant director of industrial relations, research, American Steel & Wire Co., Cleveland. Mr. Forbes has been associated with the Wire company since 1936.

• **R. E. Ellis** and **W. H. Robbins** have been assigned to the engineering department; **R. E. Hartman** and **R. E. Paulson** to the sales department; **A. L. Wade** to the patent department and **F. S. Holby** to the research department in Cleveland, Bailey Meter Co. **R. E. Byers** has joined the company's St. Louis office; **N. P. Campbell,** the San Francisco office; **G. F. Fitzpatrick,** the Denver office; **R. A. Homan,** the Pittsburgh office; **T. A. Melton,** the Charlotte office; **W. G. Thiemann,** the New York office; **J. F. Kontz,** the Cleveland district office; **G. H. West,** the Atlanta office; **N. S. Wilson,** the Philadelphia office; **M. G. Johnson,** the Houston office, and **R. P. Marche,** the Chicago office of Bailey Meter.

• **J. L. Feuchter** has been appointed service engineer for the Ohio territory of the Federal Bearings Co., Inc., Poughkeepsie, N. Y., with headquarters at the company's Cleveland office. Mr. Feuchter had formerly been sales manager of the Bearings division of Jack & Heintz Precision Industries, Inc.

• **Harold F. Mosher** has been named manager of the Dallas district of industrial products sales department of the B. F. Goodrich Co., Akron, succeeding **Robert T. Kain,** who died. Mr. Mosher had been manager of special industrial merchandise sales for the last six years. He is succeeded in that post by **D. W. Raleigh.** Mr. Raleigh joined the company in 1937 and served as treasurer of the B. F. Goodrich International Rubber Co. in Manila, P. I.

RICHARD E. HITCHCOCK, field engineer and sales representative, Hannifin Corp.

• **Richard E. Hitchcock** has been appointed field engineer and sales representative in the New York area for Hannifin Corp., Chicago. Mr. Hitchcock had previously served as east coast sales engineering representative for the Bendix Products Div., Bendix Aviation Corp.

• **W. Ray Turner** has joined the Ford Motor Co. in England as chief vehicle designer. He had formerly served six years as chief engineer at the Standard Motor Co.

OBITUARY . . .

• **R. H. Horsburgh,** 65, retired vice-chairman of the board, Glidden Co., Cleveland, died recently. He was one of the original group who aided in founding the Glidden Co. in 1917.

• **Ertie L. Foreman,** 55, manager of the Los Angeles office of Whitman & Barnes, Detroit, died Feb. 9.

• **Franks G. Evatt,** 75, retired vice-president and general sales manager, General Bronze Corp., New York, died Feb. 22.

• **Joseph H. Ramsey,** 66, inventor, founder Ramsey Chain Co., Inc., Albany, died Feb. 18.

• **John H. Adams,** 92, a pioneer in the development of the iron and steel industry in the Birmingham district, died recently. Mr. Adams supervised the rolling of the first iron bars produced in that district after becoming superintendent of the Birmingham Rolling Mill Co. in 1880.

• **Myron J. Zimmer,** 56, vice-president in charge of product development for Ekco Products Co., died recently.

• **John H. Dodge,** 69, retired president, treasurer and director, Lowell Wrench Co., Worcester, died Feb. 4.

• **William Schmidt,** 56, pattern department foreman, Buffalo Pumps, Inc., North Tonawanda, N. Y., died Feb. 9.

• **Joseph E. Michaels,** 45, secretary and treasurer, Hyman-Michaels Co., Chicago, died Feb. 19.

• **Paul Fielden,** 62, director of purchases, Norton Co., Worcester, Mass., died Feb. 6.

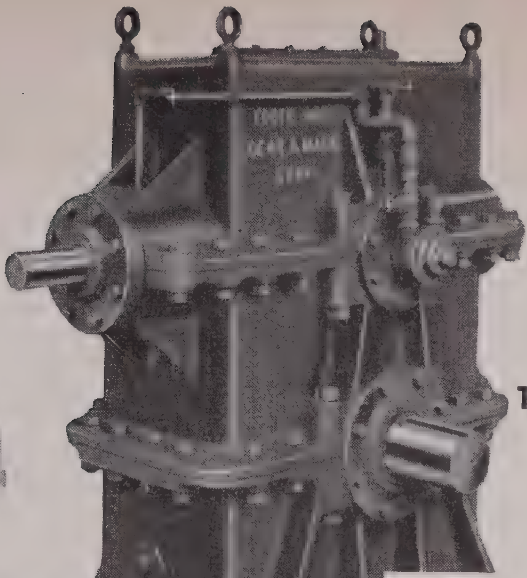
• **George F. Naab,** 60, president and general manager, North American Mfg. Co., Cleveland, died Feb. 16.

• **Hugh L. Thompson,** 85, retired consultant engineer and authority on the development of brass and copper industries, died in Waterbury, Conn., Feb. 14.

• **Raymond T. O'Brien,** 54, formerly district sales manager of the Johns-Manville Sales Corp., Buffalo, died Feb. 10.

need a

drive like these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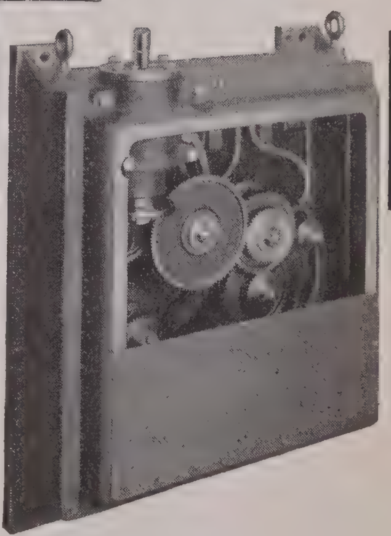
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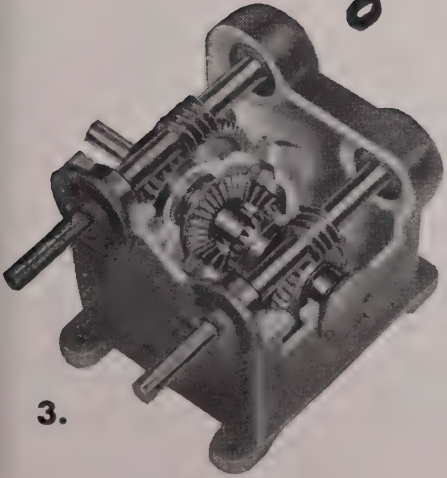
3.

One of the services Foote Bros. renders industry is the production of drives such as these shown here to meet individual needs.

1. Here is a giant gear reduction unit engineered to stand the pounding, crushing force necessary in the production of asphalt tile.
2. Here is a textile mill drive that not only provides a number of shaft speeds, but also permits gear ratios to be changed quickly.
3. Here is a small, compact unit that permits a quick change from forward to reverse on a predetermined time cycle.

If you are now using special drives on the equipment you manufacture, be sure to investigate the facilities of Foote Bros.' large plants completely equipped to produce gears and drives to meet practically any need.

If you are faced with a problem in the design of gears or transmission equipment, Foote Bros. engineers will gladly assist you in finding the correct solution.

Of course, Foote Bros. also can furnish a complete range of standardized speed reducers to meet almost any industrial need. The more popular sizes and ratios are available from stock.

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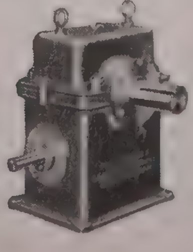

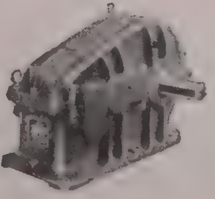

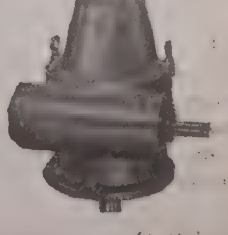

European Letter . . .

• Western Powers not preparing for war . . . Determination for self-defense holds Russian aggressive tendencies in check . . . Pooling defenses involves important modifications in nations' military and industrial methods.

LONDON—The defense White Paper and Estimates and the debates which follow come at an awkward moment. On the one hand, it is quite clear that the strategic framework into which defense plans must be fitted has changed out of all recognition. Since last year's debates on defense, the Brussels Pact has come into being, the decision has been taken to concert western Europe's military plans through a Western Union joint staff with related agencies such as the Western Union Military Supply Board and Finance and Economic Committee; and the Five Powers of the Brussels Pact are negotiating jointly with the United States and Canada to draw up an Atlantic Pact of regional security. This is the new and revolutionary framework. But on the other hand, nowhere has military planning reached so precise a state that its results can begin to appear in national budgets as exact estimates of the contribution each nation will be expected to make. In these conditions, the debates on defense will not necessarily produce a clear picture of Britain's commitments.

One obvious point, however, emerges both from the discussions on the Atlantic Pact and from the defense expenditures forecast for 1949-50. The western powers are not preparing for war. There is, of course, not a shadow of justification for Russia's trumpetings about imperialist preparations for aggression. In one or two cases, notably France, expenditure on defense has actually been reduced. In Britain, the number of men under arms at the end of the year will be smaller than in 1948. Even the American increase is no more than is necessary to build up minimum defense forces in place of the skeleton army which was all that remained after the pell-mell demobilization of 1945 and 1946. If there were preparations for attack, the scale and tempo of rearmament would be unrecognizably different. Equally, the estimates do not envisage even a defensive war. Neither the pace at which discussions between London, Washington and Fontainebleau proceed, nor the proportions of national incomes devoted to defense in the national budgets reflect any sense of desperate urgency—certainly not the urgency which would arise if aggression were believed to be imminent and unavoidable.

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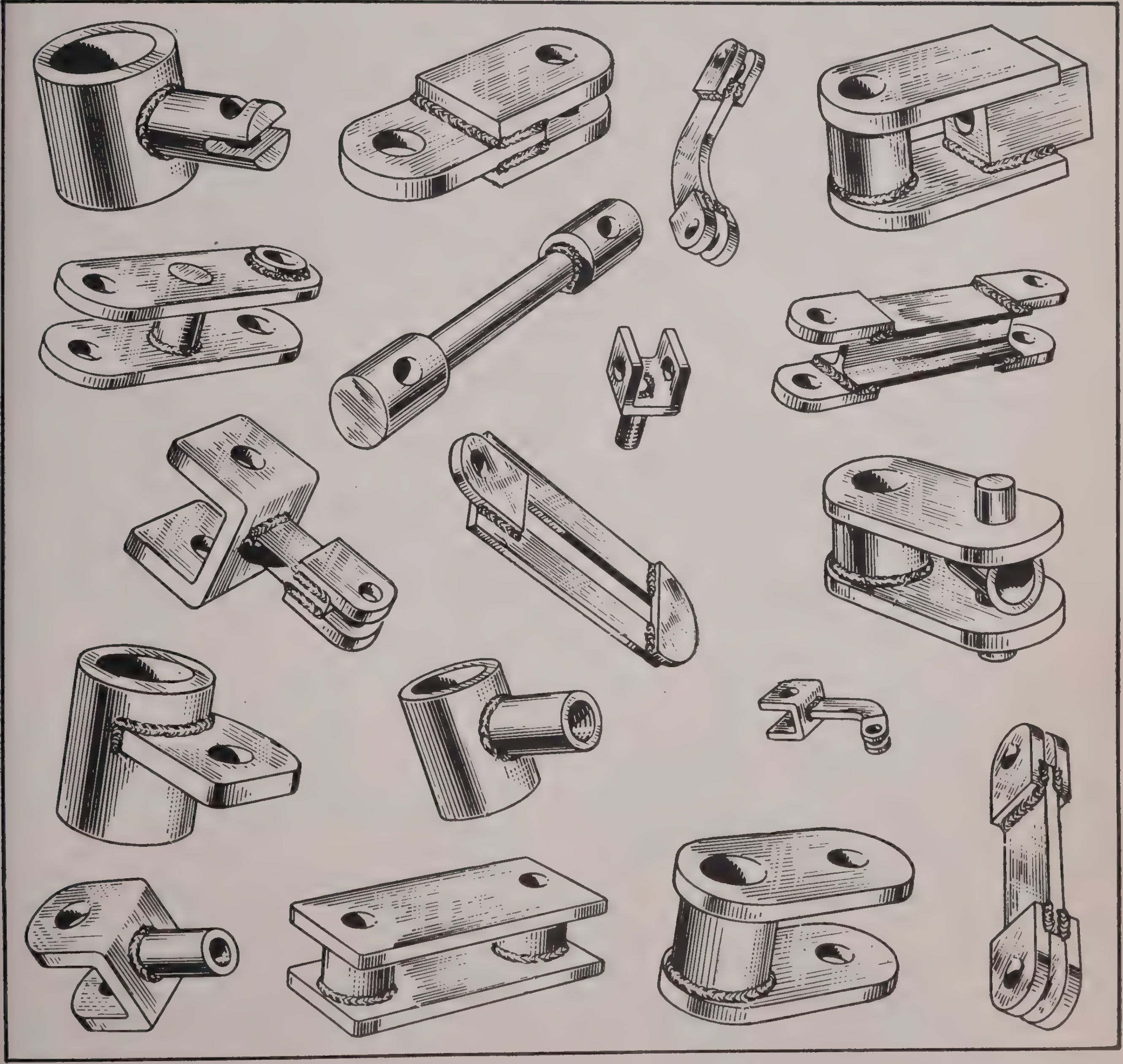
IF, however, the possibility of immediate war is neither the cause, justification nor aim of present military planning in the west, how can its purpose be defined? Any sensible discussion of ways and means must depend upon the definition of purpose. What is the concerting of strategy and the reconsideration of armament designed to bring about? It is evidently the judgment of western statesmen and soldiers that any aggressive tendencies in Russia can be held in check provided that the western powers make clear their determination to defend themselves. It is their will to resistance which is the guarantee of peace; the whole purpose of the Brussels Pact, the Atlantic Pact and the pooling of defense policy is simply to turn a vague determination to resist aggression into an intelligent, flexible and fully worked-out strategy of resistance.

This is the crux of the present stage in military planning. Resistance is not simply a mood and an aspiration. To be effective, it must be made a military fact and the work accomplished so far makes it clear that the success of the attempt will turn on three issues. In the first place, the adherence of the United States to the joint defense system is the condition of everything else. Western Europe alone is not formidable enough to deter an aggressor simply by making known its will to resist. The second point is that the scale of equipment and the strategic disposition of the Atlantic Allies should be such as to allow them to hold western Europe against attack for the time necessary to bring up their reserves and deploy their full resources. The third point is in essence an expansion of the second. The Allies would need to make plans for the most rapid expansion of military supplies once aggression had either taken place or was seen to be unavoidable. Such plans involve not only pooling and standardization of military equipment. They demand plans for speedy industrial mobilization and the immediate expansion of war plant.

THESE three points are presumably at the head of the Allies agenda and one at least must already be reasonably near solution. In spite of the flurry caused by the Senate debate on the Atlantic Pact, it is clear that the United States is morally committed to the defense of Europe; even if no clause in the proposed treaty actually commits the United States to automatic war, the intention to concert all measures necessary to defense with its Allies will go as far as any

How to Build Links at Less Cost with Arc Welding



The links and clevises shown above are typical of the many different kinds of machinery component parts that are being fabricated today at less cost with arc welding than with other methods. Welded steel parts like these are decidedly stronger and more rigid, yet require considerably less material to build. Amazingly simple in design, welded steel machinery parts can be produced efficiently in all quantities using steel plate and standard mill shapes and forms.

More detailed data on the design of links and other machinery parts for arc welding is contained in the "Procedure Handbook of Arc Welding Design and Practice." Price $1.50 postpaid in the U.S.A., elsewhere $2.00.

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document can to express the nation's abiding purpose. The test of the moral commitment will, after all, lie less in the wording of a treaty than in the concrete measures of standardizing plans and resources which will flow from the Pact once it is signed.

It is the second and third points of the agenda which seem most obscure for the time being—and must probably remain so. In a sense, the military problem resembles the economic problem posed by the offer of Marshall Aid in 1947. In both cases American aid was conditional upon European self-help and upon a pooling of European resources. But in the military field, even more than the economic, the American contribution is decisive and some of the planning which will make western defense flexible and effective can hardly be done until the scale of American military assistance in men and material has been assessed. Military planning seems to have reached the stage which economic planning reached between October, 1947, and January, 1948. The European partners had made the best estimate they could of their own resources. They were still uncertain whether the American contribution would fill the gap. Yet until they had some idea of the American orders of magnitude, they could hardly enter into final commitments themselves. So it is with the discussions which hinge on the Brussels Pact. It is obvious that a number of decisions must await the Atlantic Pact. By the chance of the calendar the defense debates in Britain, in which some of those decisions might have been usefully discussed, are likely to be over before the wider Pact is signed.

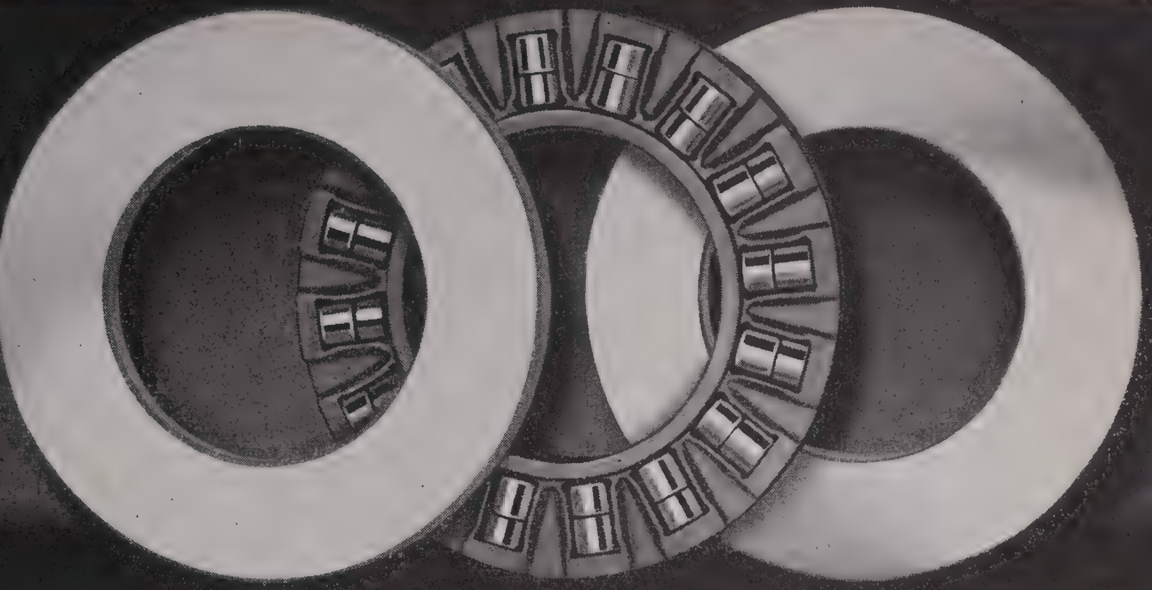
YET while the various European governments can be excused if they are not very forthcoming on the question of concrete plans for defense, there is less excuse for their failure to put the broad strategic issues before their parliaments. In Britain, in particular, discussion on strategy seems less mature than American discussions in the same field. Yet if Britain is to supply effective leadership in European defense, public opinion must have had some opportunity of considering the obligations and problems which leadership entails. The Minister of Defense cannot reasonably be expected to fill in the whole strategic pitcure. But he can and should give some notion of where the burdens are likely to fall and, in general terms, of what commitments are to be accepted in the name of the British people.

Such preliminary discussion is particularly important when the pooling of defense involves important modifications in the nations' traditional military or industrial methods. For instance, it is probably not necessary to indoctrinate public opinion on the need for the integrated early warning system mentioned in the White Paper which will give all western Europe instant notice of approaching aircraft. Nor will the public be surprised to learn that the British aircraft production program includes the supply of new aircraft to the air power of western Europe. But a solid effort of explaining and convincing will be necessary to press through other less orthodox and technical schemes of coordination. It may, for instance, prove necessary to build up a standing army in western Europe in which contingents from the various nations will serve together as a single entity under a single joint command. Such a radical transformation of traditional methods of organization and training will no doubt be accepted, if the case for it can be proved. But sprung upon an unprepared House of Commons, representing an ignorant public opinion, the suggestion might weaken the whole effort of coordination. Similar difficulties could arise over the issue of conscription and the need, for the sake of both justice and good understanding, to make the burdens borne by the different partners broadly proportionate. Or, to take an example from another field, there will probably be little need to educate public opinion in the desirability of standardizing military equipment. But much more delicate questions of sovereignty are raised by the issue of rationalizing arms production. It is unlikely that western European resources will best be served by each national industry producing some of everything. Production will need to be concentrated and certain nations and certain firms may lose traditional types of production in the interests of general efficiency. The possibility of such changes, difficult enough, in all conscience, should therefore be canvassed to prepare opinion for them if they become necessary. Otherwise, the reaction to sudden proposals may be dangerously negative.

NOR is it simply a question of preparing public opinion to accept the unorthodox and the unexpected. Full and serious discussion is necessary when real points of principle are involved. At the present moment, for instance, there are signs that the question of manpower for western defense is throwing up a problem whose solution cannot be based on purely technical considerations. The evident shortage of men to fill the cadres and produce the war material of western Europe has led in certain quarters to the suggestion that Germans might be used to supplement the numbers provided under the Brussels Pact. The proposal varies from the recreation of a German defense force to the recruiting of Germans for service in other national armies, or in a Western Union defense force, provided they occupied no post above that, say, of major.

The rearming of Germans is a matter of political principle and it is essential that the reference of the issue to public debate should permit the very grave objections to any such proposal to be fully canvassed before the technical arguments are considered. In the first place, to allow Germans to carry arms within four years of victory would undo all the work of moral and political reconstruction which has been so painfully attempted. In the second place, the crisis of confidence among Germany's immediate neighbors in western Europe might well weaken the solidarity of the western alliance sufficiently to outweigh any technical advantage. In the third place, the arming of Germans in the west which would encourage and extend the arming of Germans in the east might create the one condition in which the cold war could slip into a hot war—civil conflict in Germany itself. But the chief argument remains political.

KAYDON TYPE RT THRUST ROLLER BEARINGS



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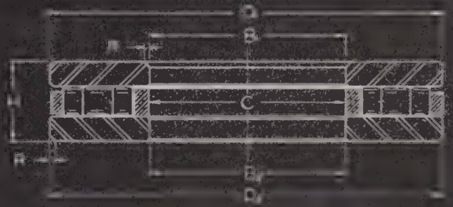

SIZES AS LISTED
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Bearing No.	Sizes and Dimensions • See Drawing Above						Roller Diam.	R 45° Chamfer	Lbs. †Capacity at 100 R.P.M.
	B_1	B_2	C	D_1	D_2	H			
RT-26	2.002"	2.015"	2.010"	5.968"	6.000"	1.375"	½"	.062"	36,000
RT-27	2.002	2.015	2.010	6.968	7.000	1.375	½	.062	48,300
RT-28	2.002	2.015	2.010	7.968	8.000	1.375	½	.062	65,400
RT-36	3.002	3.015	3.010	5.968	6.000	1.375	½	.062	29,800
RT-37	3.002	3.015	3.010	6.968	7.000	1.375	½	.062	43,600
RT-38	3.002	3.015	3.010	7.968	8.000	1.375	½	.062	55,600
RT-39	3.002	3.015	3.010	8.968	9.000	1.375	½	.062	67,500
RT-47	4.002	4.015	4.010	6.968	7.000	1.750	⅝	.062	34,700
RT-48	4.002	4.015	4.010	7.968	8.000	1.750	⅝	.062	54,600
RT-49	4.002	4.015	4.010	8.968	9.000	1.750	⅝	.062	69,400
RT-410	4.002	4.015	4.010	9.968	10.000	1.750	⅝	.062	89,300
RT-58	5.002	5.015	5.010	7.968	8.000	1.750	⅝	.062	40,300
RT-59	5.002	5.015	5.010	8.968	9.000	1.750	⅝	.062	63,300
RT-510	5.002	5.015	5.010	9.968	10.000	2.000	¾	.125	83,300
RT-511	5.002	5.015	5.010	10.968	11.000	2.000	¾	.125	111,600
RT-512	5.002	5.015	5.010	11.968	12.000	2.000	¾	.125	136,300
RT-69	6.002	6.015	6.010	8.968	9.000	2.000	¾	.125	48,300
RT-610	6.002	6.015	6.010	9.968	10.000	2.000	¾	.125	76,000
RT-611	6.002	6.015	6.010	10.968	11.000	2.000	¾	.125	100,100
RT-612	6.002	6.015	6.010	11.968	12.000	2.000	¾	.125	124,300
RT-710	7.002	7.015	7.010	9.968	10.000	2.000	¾	.125	62,400
RT-711	7.002	7.015	7.010	10.968	11.000	2.000	¾	.125	85,800
RT-712	7.002	7.015	7.010	11.968	12.000	2.000	¾	.125	109,200

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All types of Ball and Roller Bearings 4" bore to 120" outside diameter

• **ORE CONSUMPTION**—U. S. and Canadian blast furnaces consumed 7,590,471 gross tons of Lake Superior district iron ore in January, highest monthly consumption since March, 1944, according to Lake Superior Iron Ore Assn. If maintained at the January rate, 1949 consumption of iron ore will equal the 89 million gross tons consumed in 1943, peak year of the war effort, when blast furnaces not normally dependent on Lake Superior district iron ore were being supplied. January consumption of 7,590,471 gross tons compares with 7,351,059 gross tons consumed in December, 1948, and 7,056,667 gross tons in January, 1948. Gross tons of iron ore on hand at furnaces and Lake Erie docks totaled 31,904,181 tons Feb. 1, compared with 39,460,497 tons a month ago, and 29,081,189 tons on Feb. 1, 1948. Active blast furnaces depending principally on Lake Superior district iron ore numbered 177 U. S. and 9 Canadian. Eight U. S. furnaces and one Canadian furnace were idle.

• **FERROMANGANESE UP**—E. J. Lavino & Co., Philadelphia, have increased their price at Sheridan, Pa., for standard lump ferromanganese 7½ pct to $172 per gross ton for carload quantities. Increase is effective immediately on spot sales but first quarter commitments will not be immediately affected. Quantity, size and pickling extras are unchanged.

• **EXPANSION**—A $4 million expansion program, including immediate construction of a porcelain enameling plant to cost $2,163,000, has been announced by Kaiser Fleetwings, Inc., Bristol, Pa. The plant, to be built on a 26-acre plot opposite the company's main building, is expected to be completed by late fall. The two buildings are to be linked by a conveyor system.

• **ASKS MORE DEBT**—Aluminum Co. of America will ask stockholders at the annual meeting Apr. 21 to approve a proposed increase in authorized indebtedness from $150 million to $200 million. In April, 1947, the company's permissible indebtedness was raised from $100 million to the current level.

• **HURRY, HURRY**—A blast furnace formerly owned by Carnegie-Illinois Steel Corp. is being rushed into production at the Mingo works of Wheeling Steel Corp. Potential daily yield is 700 tons of iron. Furnace is one of three acquired by Wheeling from Carnegie-Illinois in 1944. The other two resumed output in 1948.

•**TRUCKERS LIMIT LOADS**—Central States Motor Freight Bureau has recommended new maximum loads permitted in the truck hauling of steel shipments. Twenty-five major steel hauling companies have adopted the tentative program. The scheduled maximums which steel shippers are being asked to observe in their ladings range from 20,000 lb for straight trucks up to 70,000 lb for tractors, semi tandem trailer and trailer units. According to Mr. Proehl, president, Steel Transportation Co., East Chicago, Ind., motor carriers are now hauling up to 35 pct of the output of some steel plants in the central, Midwest area. He said the water carriers account for 10 pct and the rails take the remainder.

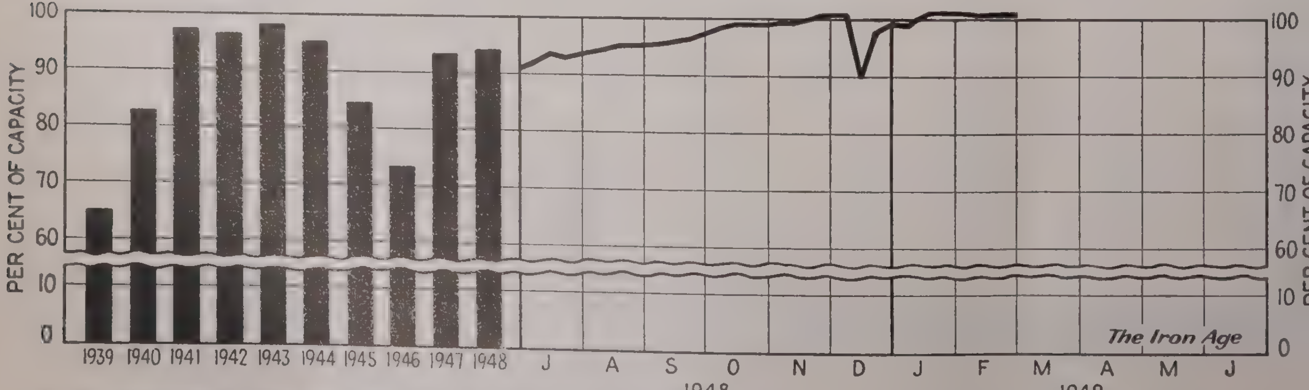
• **ELECTRICAL SHEETS**—Follansbee Steel Corp. last week became the second silicon sheet producer to announce a competitive price cut. Follansbee's reductions ranged from $23 to $30 a net ton, meeting major competition in electrical, motor and dynamo grades. Transformer grade prices are straddled by the competition. New prices, 24 gage base, hot-rolled, cut lengths, in cents per lb, are: Electrical, 5.95; motor, 6.70; dynamo, 7.50; transformer, 72, 9.15; transformer 65, 9.85; transformer 58, 10.55; and transformer 52, 11.35. They were effective Feb. 24.

• **IRON PRICE CUTS**—Effective Feb. 21, Lone Star Steel Co., Lone Star, Tex., reduced the price of No. 2 low phosphorous foundry iron to $50.50 per ton. E. B. Germany, president, also announced that negotiations are under way for the sale of a large quantity of basic iron and that this price will be $50.00 per ton. Heretofore all of Lone Star's production has been foundry iron which was sold at $75.00 per ton f. o. b. Lone Star, Tex.

• **ALONE**—Temporarily, at least, GM may be left alone with its recently announced auto price cut. Ford has already indicated that a price decrease is not contemplated at the Rouge. The recently announced price boost of 6.66 pct leaves Chrysler in no position to make a change now. Most Detroit sources believe further auto price cuts, if they come, will be by the independent producers.

• **LAYOFF**—Lustron Corp. has temporarily laid off about 400 workers. Some 250 of them had been turning out parts by hand and dies and tools are being set up to handle these parts. About 150 other workers were laid off because their department was ahead of manufacturing schedules.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
February 22....	101.5*	103.0*	94.5*	101.0	99.0	105.0	98.0	94.0	103.0*	100.0	110.0	89.5	110.0	100.5
March 1.	107.0	101.0	94.0	101.0	100.5	105.0	97.5	95.5	102.0	102.0	110.0	82.5	91.5	100.5

* Revised.

Industrial News Summary

- ***Steel Market Closer to Normalcy***
- ***More Signs Showing Up This Week***
- ***Steel Cutting Its Own Supplies***

BACK-TO-NORMALCY was coming to the steel industry at a fast clip this week. Some steel people were worried that it might mean more than a mere trend to the regular way—competition—of doing business. But there were no signs that the bottom was ready to drop out of steel.

Those who get the jitters easily though were having a tough time sizing up the steel market. It was clear that things were happening. And fast. But it all spelled a condition that both buyer and seller have been saying they would like to see. Now it can be found out who was or wasn't kidding.

Here are signs that things are changing in steel: (1) Some steel firms which had higher prices than the majority have dropped them to regular mill levels; (2) cancellations, although not too heavy, are becoming more frequent; (3) holes in rolling mill schedules are opening up oftener than a month ago; (4) some holders of non-cancellable conversion contracts are trying to buy their way out of these commitments and (5) customers of steel firms are getting as cautious as credit managers over their new orders and their inventories of finished goods.

To offset these hard facts here are a few that show things are not going to ruin in a wheelbarrow: (1) Steel orders are still heavy and backlogs—even when dried out—are not bad; (2) government spending is still heavy and may be bigger if unemployment continues to increase; (3) exports in steel may be expanded now that domestic demand is no longer in the emergency class and (4) back-to-normal does not mean a plop to the cellar.

Another little straw in the wind which may finally turn out to be a whole broom is the paring of allocation tonnage slated for domestic use. Even though the Administration—which fights for more steel capacity—has dragged out three new programs to take 50,000 tons of steel a month on allocations, domestic allocated programs were cut last week to the tune of 137,000 tons a month. It is clear that as the domestic front takes an easier tone allocations for export and other Administration-favored uses will be bumped. It is even probable that the three new programs inserted into the allocations program last week were put there to keep the main program puffed up.

THIS week steel people were studying their own supplies of material. In all cases the drive is on to get stocks down to a lower level. Some steel firms are trying to get raw materials and other items down to a 30-day supply. Especially in cases where they have been carrying items which before the war were carried in stock by suppliers.

This drive in the steel industry to keep stocks down has extended to steel scrap. There is no reason to look for heavy scrap buying in the near future. Most firms have large stocks and are cutting them. As to coal, no one in steel is too worried about the probability of a coal strike. Coal stocks above the ground and ahead of coke ovens are larger than they have been for years. It would have to be a long strike to seriously cut steel output.

Steel sales people are checking sales of their customers wherever possible. Gone are the days when too much reliance was placed in steel backlogs. Most oldtimers know that steel backlogs can fade away in a short time—and have in the past. The real test, say steel sales officials, is "how are orders to customers of steel firms?" A check on that part of the steel picture shows the same sense of caution but no sign of things falling apart. Makers of things fabricated and processed from steel are just as cagey as anyone else. They are watching their inventories, their sales, and are needling their salesmen to get going.

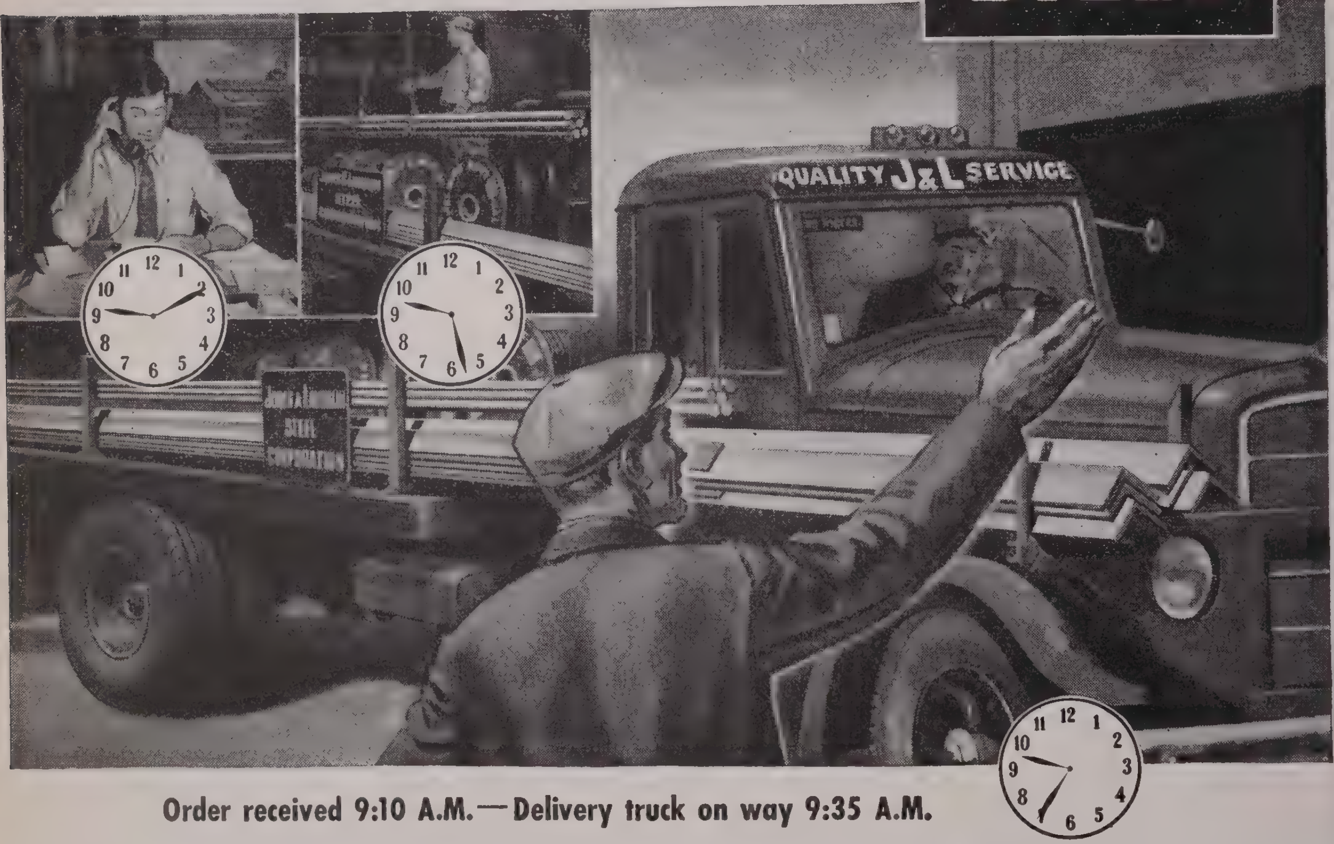
SOME steel consumers who have been using substitutes for steel over the past few years have gone back to their first love. As a result there is more aluminum floating around parts of the Middle West. The better sheet position, availability of steel tubing and more galvanized sheets have caused some steel users to revert to former practices. This does not mean that all the tightness in those steel items mentioned has disappeared, but it is a trend.

Another sign of the times has been the insistence of steel users on close tolerances as to grade and quality. A year ago anything made of steel had a good chance of being used. Today a lot of customers are getting choosey and some of them are getting away with it—they are getting what they ask for.

The steel ingot rate this week is again at 100.5 pct of rated capacity. This outpouring of steel will accentuate all the factors that have been given suggesting that steel is going quickly to a normal market. There are even some hard headed men who think that the steel rate will suffer in the last quarter of this year—but they are guessing like everyone else.

DODGE Manufacturing Corporation
gets "25 minute service"
from J&L Warehouse

J&L STEEL



Order received 9:10 A.M.—Delivery truck on way 9:35 A.M.

At 9:10 on a Saturday morning, a telephone rang at Jim Sproat's desk in the J&L Warehouse in Chicago. At the other end of the wire, 80 miles away in Mishawaka, Indiana, C. L. Mechling, purchasing agent of the Dodge Manufacturing Corporation, said he needed some help . . . quick. He had to have seven bars of 2-7 16″ cold finished steel shafting, 16 and 20 feet long. They were needed for the power transmission system in a big industrial plant. Until they arrived, the plant could not operate. When could he have them?

There was some fast footwork. In the warehouse was a J&L truck which was going through Mishawaka. In the warehouse was steel of the proper grade and size. At 9:27, the steel was being pulled out of racks. At 9:35 the truck was on its way.

Unusual? Certainly, it was unusual. J&L Warehouses cannot get every order on its way in 25 minutes! But it happens often enough to make a lot of customers lean heavily upon them.

Quick service is a habit at J&L Warehouses—part of their stock-in-trade. Located at strategic distribution centers, they provide close-at-hand, convenient, dependable sources of supply for all who need steel in a hurry. Stocks are large and diversified, including not only the more common grades of steel, but many special grades as well—all of J&L Controlled Quality.

Listed below are the 7 Jones & Laughlin Service Warehouses and their phone numbers.

When you need steel—quickly—call your J&L Warehouse first!

CHICAGO 9, ILL.	**VIrginia 7-1600**
CINCINNATI 2, OHIO	**MAin 2323**
DETROIT 7, MICH.	**WAlnut 0470**
MEMPHIS 1, TENN.	**5-1625**
NEW ORLEANS 6, LA.	**FRanklin 1131**
PITTSBURGH 3, PA.	**HEmlock 1000**
***LONG ISLAND CITY 1, N. Y.**	**IRonsides 6-8700**

*Operated by Jones & Laughlin Steel Service, Inc.

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

Oldtimers In Steel Cross Fingers and Guess at Future Prospects

Needle Being Put Into New Steel Salesmen; Old Ones Know What is Coming

By TOM C. CAMPBELL
News-Markets Editor

New York

• • • **Steel people** are whistling to keep up their courage. Orders are good, production is good, shipments are breaking records. But most steel sales managers who have been through cycles before have their fingers crossed.

In the past several weeks there has been some double talk about the steel picture. It has not been intended to hide the facts. It has just resulted from not knowing what to expect. And it also comes from some people who have been shocked before when their predictions did not come true.

A close look at the steel picture this week shows no cracks, no wide open seams and no evidence of a serious falling apart of business as evidenced by backlogs and order books. But, just in case, it is known that these companies who use a little imagineering are putting the needle into their salesmen. In some cases the needle is long and sharp. In other cases the salesmen are ahead of the needle—that is those who have already seen the handwriting on the wall. Now is the time to cultivate, visit, and do anything else that spells "here we are what can we do for you."

What are the little things that have given some steel managers the jitters lately? Some are intangible. Others should be clear even to a blind man. And still others are as subtle as *The New Yorker*. The greatest stumble jam to quick thinking has been the desire to disbelieve that the great wonderful bubble could burst or that it could deflate quite a lot. At least that's what salesmen of experience say in private.

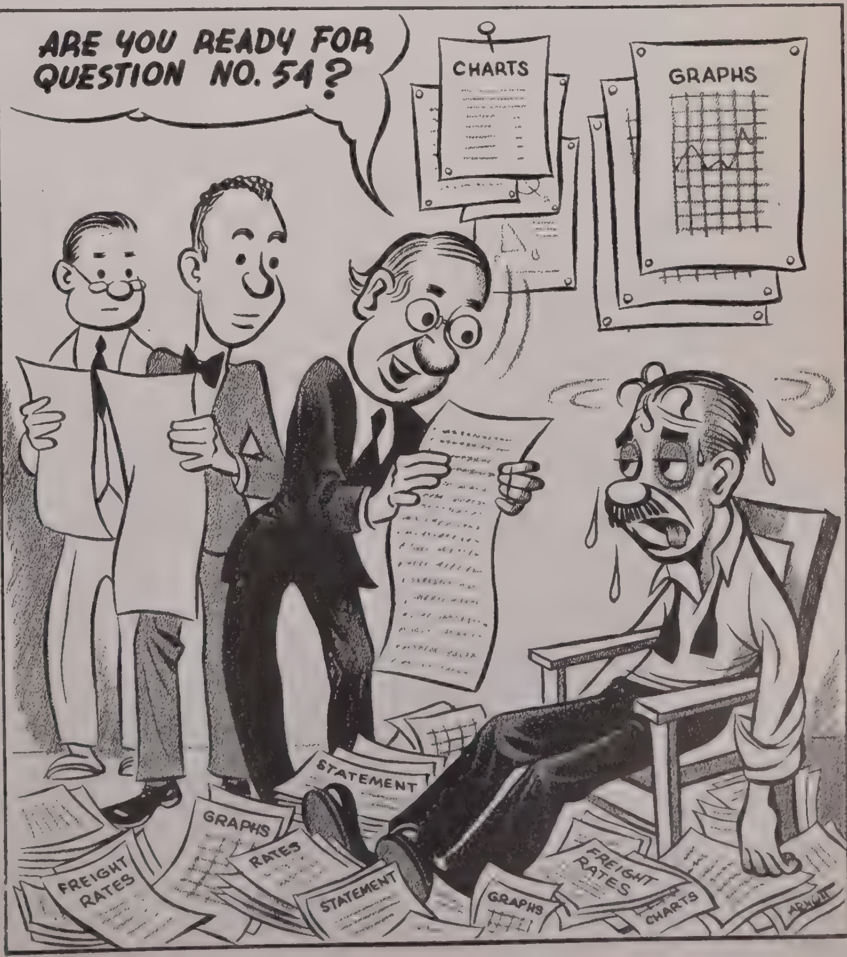
There is a good healthy movement going on now in the steel industry to admit that: (1) The sales and research people don't know everything (2) the customer may soon be the boss (3) unless there is great pump priming by way of military programs things will balance soon and (4) the steel industry is still cursed with no plateau but with ups and downs.

The intangibles in the steel picture are data on orders reaching steel industry customers. No one knows clearly how this volume of orders compares. It is important. So important that it spells the ingot rate many months from now. It is known that appliance sales are off. That is discounted on the basis that they are small potatoes. But they use steel. And if they are not in there supporting the high steel rate it is not good.

Then there is the railroad picture. With section hands, maintenance men and car building employees laid off that means less steel. How much may not show up until later. But it will show up. The railroads are not ordering freight cars. Passenger cars are being built and will be ordered. But all railroad orders are now placed with an eye to revenue. And that picture isn't so good. Not all carloading declines are due to less overall business. A lot of them are due to bigger use of trucks.

Oil people licked their shortage last year with higher prices, more production and heavy capital ex-

Basing Point Quiz (See p. 148-A)



penditures. Some oil firms are through expanding for a while. Others are getting nervous. Still others say their steel needs will soon come into a normal balance. This can mean a lot of steel companies later in the year when 1950 budgets are drawn up—or maybe before.

Automobile support—the mainstay of steel for years—is not wobbly but it hasn't the old zing it had a year ago. Then auto firms were yelling that steel shortages were closing plants. Now plants are closed "for other reasons" one of which is because people don't have the kale to buy high priced cars—or don't want to. But the steel demand to meet needs for small cars may help to make up the loss from higher bracket car building—maybe it won't fill up all the gap.

Each of these things taken by itself does not look bad. It is when they are all rolled up in a package that they hit the steel sales departments. It is true that there is no sign that the steel rate will dip, orders will dry up and things will go to hell generally. But wideawake steel sellers say that that is no reason to sit on their hands, safe in the belief that it won't happen. Rather they are getting on the ball, getting acquainted again and trying to break into deals from which they used to run. It is all very common and normal. And the very feel of the thing spells competition in steel.

One steel executive stated his personal opinion this way—and it is good enough for others who were interviewed; "most steel products will be in balance by the latter half of this year. Some will be in greater supply than demand. Only a few will be tight. The only thing that could prevent this would be a military program for the United States and Western Europe which would call for high production of armament at a wartime rate."

Dravo Builds Dry Cargo Barges for Fast Towing

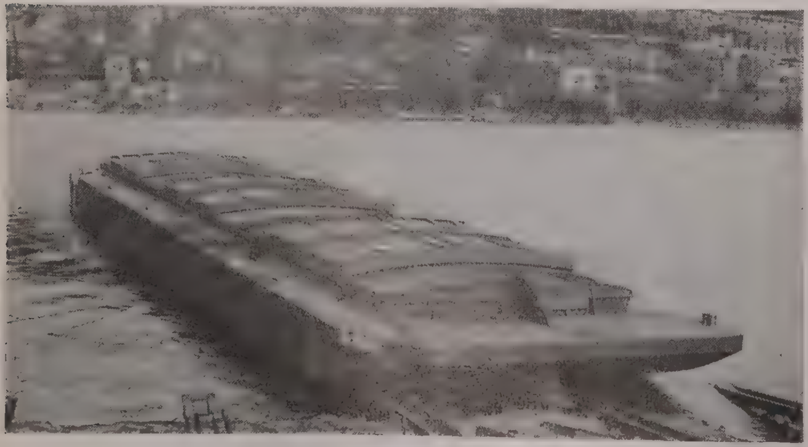
Pittsburgh

• • • **What is believed** to be the first barge specifically designed for dry cargo was recently launched by Dravo Corp. at Neville Island, near here. Its square stern permits it to be combined with a duplicate unit and towed at 10 to 11 water miles per hr in contrast with normal river towing speeds of 6 to 8 mph.

The first two-barge unit, of a fleet of six 240-ft barges, has been completed by Dravo for Butcher-Arthur, Inc., Houston. Each can carry 2500 short tons of sulfur, salt or chemicals from the Gulf Coast to the mid-continent area. On the return trip each barge can accommodate 48 automobiles in its hold and another 48 on the specially prepared hatch covers.

The barge is 50 ft wide and 11 ft 8 in. deep. It has one transverse bulkhead in the hold. In it are two openings, each large enough for an automobile or small truck, so that when the vehicles are driven into the hold on a ramp they can be moved into place.

The barges are built of welded steel throughout. Corten, high tensile corrosion resistant steel, is used for part of the bottom and the bilge plating. These areas get excessive wear in towing on the Intercoastal Waterway, where the vessels often scrape the banks on sharp turns.



FLEET: *Design of this specially built dry cargo barge permits it to be towed much faster than conventional units. It is one of a fleet of six being built by Dravo to transport chemicals north from the Gulf and motor cars south to that area.*

Marshall Plan Only Slightly Benefiting Machine Tool Trade

Washington

• • • **Marshall Plan** aid to Europe was of little immediate benefit to the machine tool industry during its first 9 months ending Dec. 31, the latest date for which detailed figures are available.

During the period, procurement authorizations for $30 million worth of American-made machine tools were approved. The Economic Cooperation Administration has no record of actual orders placed, but as of Jan. 1 shipments reported to the agency totaled slightly more than a half-million worth. These went largely to France, United Kingdom and Holland.

Britain was the largest potential customer, obtaining ECA approval for $10.6 million worth, and France rated second with $6.6 million worth. In addition, France was authorized to buy $85,000 worth from the bizone and $58,000 from Canada with neither country reporting any shipments.

As of actual shipments from American manufacturers, reports to ECA indicated that $202,000 worth were in transit to France and $333,000 worth to Holland. Actual shipments, ECA points out, may be somewhat larger due to the normal lag in forwarding shipping documents to the agency.

Stewart-Warner Dividend

Chicago

• • • **Stewart-Warner** Corp. directors have declared a cash dividend of 25¢ per share on the $5 par value common stock, payable Apr. 9, 1949, to stock of record at the close of business Mar. 18, 1949.

Voluntary Allocations Programs Cut; Three New Ones Take Up Part of the Slack

Washington

• • • **Even Capitol Hill** took a somewhat bearish view of the steel market last week. At least it did compared to some of the capacity thinking which has been emanating from there in recent weeks. The significant event was the temporary revision downward of existing voluntary allocations programs by about 137,000 tons.

Part of the slack created by this move was taken up by the approval by the Office of Industry Cooperation of three new programs involving 50,000 tons per month through the Spring and Summer.

Chief of these is allocation of 32,347 tons monthly to the Economic Cooperation Administration, May through September. This will consist mainly of plate for shipbuilding and repair.

Major beneficiaries of the ECA allocations will be

Norway—Plate, 54,545 tons; sheet, 6580 tons; strip, 2840 tons. Total, 63,965 tons.

Denmark—Plates, 12,500 tons; sheets, 2475 tons; strip, 500 tons. Total, 15,725 tons.

Netherlands—Plates, 3201 tons; sheets, 5000 tons; strip, 2400 tons. Total, 10,601 tons.

Sweden — Plate, 8500 tons; sheet, 6850 tons, and strip, 425 tons. Total, 15,775 tons.

The other new programs involve a total of 85,618 tons for May through September for reclamation activities of the Interior Dept. and 950 tons monthly during April, May and June for manufacture of baseboard radiation.

More than offsetting the newly allocated tonnages are the temporary revisions downward of existing allocations by about 137,000 tons.

Major revisions, in light of existing conditions, included: Freight cars, from 249,682 to 190,000 tons; armed forces, from 102,505 to 61,000 tons; barges, from 25,000 to 16,000 tons; tankers, from 40,380 to 26,380 tons; atomic energy, from 16,114 to 10,000 tons, and merchant marine, from 15,415 to 13,400 tons.

Also, while the program for fabricated steel houses has been extended, no further allocations will be made in the foreseeable future. As for warm air heaters, the present allocation of 31,625 tons will be reduced to 26,400 tons through June with no quota at all for the month of March.

Total reductions amount to more than 137,000 tons monthly as against about 50,000 tons increase.

These new and revised allocations will be constantly reviewed and are subject to change, either upward or downward, according to the situation from month to month, Earl W. Clark, Director of OIC, told THE IRON AGE.

Forms Research Division

Cleveland

• • • **Establishment of a** research division in the industrial relations department of American Steel & Wire Co. was announced recently by Francis J. Burtt, industrial relations director of this U. S. Steel subsidiary.

The new section will be headed by C. J. Forbes, formerly assistant to director of industrial relations. Mr. Forbes has been associated with American Steel & Wire since his graduation from Harvard University in 1936.

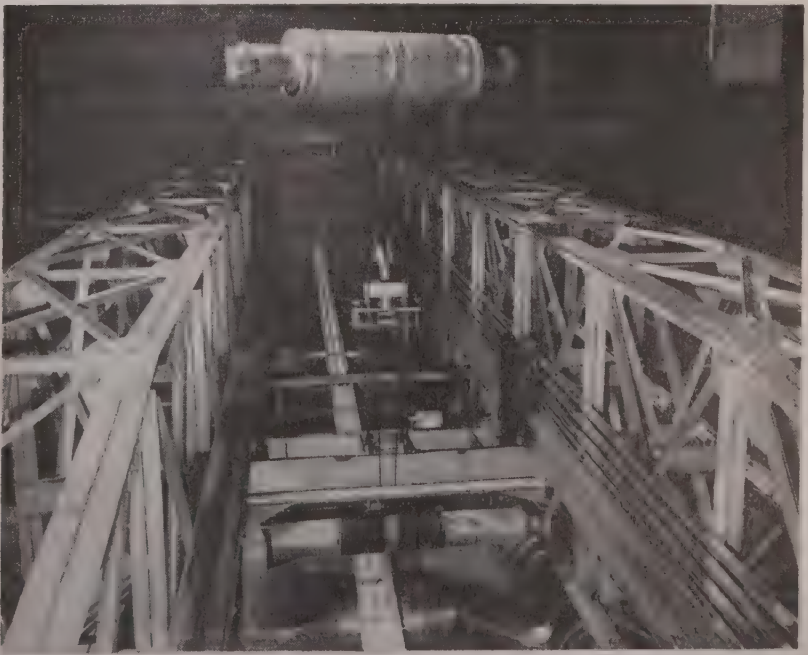
Establishment of the new division has been made necessary by the increasing importance of research activity relating to labor contracts, industrial relations policies, etc., Mr. Burtt explained. These functions have been carried on informally for several years within the department, and henceforth will be centralized under Mr. Forbes' direction.

Baldwin Declares Dividend

Philadelphia

• • • **At the regular** meeting of the Board of Directors of the Baldwin Locomotive Works approval was given to the declaration of dividends on the company's $13 par value common stock on a quarterly basis. The Board then approved of an initial payment on Apr. 30, 1949, of 25¢ per share on the common stock payable to shareholders of record as of the close of business on Apr. 8, 1949.

ALUMINUM CRANE: *Believed to be the first in Canada, this 15-ton aluminum alloy crane has been installed in a rod mill of the Aluminum Co. of Canada. It was built by Dominion Bridge Co., Ltd., has a span of 97 ft. About 45 pct reduction in weight was achieved by use of aluminum. The crane is used for changing rolls and the company reports rapid acceleration in spite of use of a motor smaller than usual.*



Industrial Briefs . . .

- **Anniversary**—U. S. Pipe & Foundry Co., Burlington, N. J., producers of cast iron pressure pipe, is celebrating its fiftieth anniversary this month.

- **Acquisition** — Minneapolis-Honeywell Regulator Co. has announced the acquisition of the assets of the H. Belfield Co., Philadelphia, manufacturers of control valves. Howard L. Murray, president of Belfield, will become a vice-president of Minneapolis-Honeywell and will be in charge of the new acquisition to be known as the Belfield Valve Div.

- **Changes Name** — Spengrey Cap Corp., Louisville, has announced that it has changed its name to Light Metals Corp. due to the growth of their facilities which have increased their fabrication of metal to such a wide variety of items.

- **Expanding** — Wyandotte Chemicals Corp., Wyandotte, Mich., has acquired approximately 200 acres of land at Dilles Bottom, Ohio, 10 miles south of Wheeling, W. Va. The site was acquired for future additions in the company's organic chemical facilities.

- **Name Director**—John F. P. Farrar has been elected a director of the National Assn. of Manufacturers. Mr. Farrar is president and a director of Chicago Metal Hose Corp., Maywood, Ill.

- **Moves**—After 80 years at 81 Maiden Lane, New York, the Domestic Sales Dept. of Chas. Pfizer & Co., Inc., has moved to the Brooklyn headquarters of the company at 630 Flushing Ave.

- **Buys New Plant**—Reltool Corp., manufacturers of metal cutting tools, has announced the purchase of a new plant at 4540 W. Burnham St. for the purpose of expanding its Milwaukee operations, particularly the manufacture of milling cutters.

- **PMI Director**—The Pressed Metal Institute has announced the appointment of Orrin B. Werntz as managing director and counsel. Mr. Werntz, for the past 11 years executive secretary of the National Screw Machine Products Assn. of Cleveland, will continue his duties in that capacity in addition to his new responsibilities at PMI.

- **More Grinders**—The Vonnegut Moulder Corp., 1819 Madison Ave., Indianapolis, is reported to be preparing improved facilities for production of the Marschke line of grinders and buffers after selling its woodworking machine division to the G. M. Diehl Machine Works, Inc., Wabash, Ind.

- **Cylinder Agent** — Hydro-Line Mfg. Co., Rockford, Ill., has appointed C. E. Gobeil Co., 2635 University Ave., St. Paul, their exclusive representatives for their air and hydraulic cylinders and special machinery in Minnesota, North Dakota, South Dakota and part of Wisconsin.

- **Names Officer**—F. K. Donaldson has announced his resignation as president of the Machined Steel Casting Co. to become executive vice-president of the Steel Founders' Society of America on Apr. 1. He has been with Machined Steel for 30 years.

- **New Headquarters**—The Republic Supply Co. of California, jobbers and manufacturers of industrial and oil well supplies, has announced the opening of their new $1,250,000 home office headquarters and main company warehouse in the central manufacturing district of Los Angeles.

- **Representative**—Illinois Tool Works of Chicago has appointed Tools, Inc. of Philadelphia exclusive representative for their line of specially engineered hobs, broaches, shaper cutters and milling cutters.

Authorize Export Of 25,000 Tons of Pipe To Arabian Pipeline

Washington

• • • **Export** of an additional 25,000 tons of 30-inch pipe for the Trans-Arabian pipeline has been approved by the Commerce Dept. for the first quarter 1949. This is the first such shipment authorized since last April.

Impact of the shipments will not be felt by the domestic economy, Commerce Secretary Charles Sawyer said, not only because the entire amount is on the West Coast, "nested" for export, making it less desirable for domestic consumers, but because the firm had previously released 65,000 tons for domestic use.

Another reason for the approval, made with the assent of other government agencies, was that work would soon have had to cease on the pipeline project. The American-financed firm has agreed to furnish oil to the military services at a reduced rate based on savings in transit costs.

This agreement runs for 10 years from date of completion. Savings to the government are estimated at least $2 million a year.

No commitments have been made for the second or any future quarter, Sawyer said. He intimated, however, that more exports would be permitted from time to time, at least enough to keep the project from having to shut down.

This latest export approval brings to about 79,000 tons the shipments authorized for the project. About 171,000 tons will still be needed to complete it.

Lakey Foundry Earnings

Detroit

• • • **Lakey Foundry** & Machine Co., Muskegon, Mich., reported net earnings of $365,798 for the quarter ended Jan. 31, 1949. Sales for the quarter totaled $4,249,328. Net working capital was $2,227,900 compared with $2,196,502 a year ago.

J. O. Ostergren indicated the company expected to continue its 5-day week operations through March.

Urges Foundrymen Take Stock of Their Status

Birmingham

• • • **The president** of the American Foundrymen's Society told members of the industry the time has come to take stock of themselves.

Speaking before the 17th annual Foundry Practice Conference sponsored by the Birmingham District Chapter, A.F.S., W. B. Wallis, president of the national organization, said:

"During the past few years, foundrymen have wished for some easing of the rush so they could sit back and take stock. Now that time has come.

"It is time for foundrymen to take a good look at themselves. They will have to do two things. First they will have to iron out the inefficiencies which crept into the industry during the war. Second, they will have to keep up with new technical methods developed in recent years."

"If foundrymen do these things," Mr. Wallis said, "we can come out better and stronger than ever."

The A.F.S. president, who also is president of the Pittsburgh Lectromelt Furnace Corp., Pittsburgh, spoke Feb. 17, the first day of the 3-day foundry practice conference.

FTC Withdraws Complaint Against Phoenix Iron Co.

Washington

• • • **Finding that** the Phoenix Iron Co., 121 Bridge St., Phoenixville, Pa., is no longer producing steel, the Federal Trade Commission has dismissed its amended complaint against the corporation. The complaint charges the American Iron & Steel Institute and approximately 100 producers of steel products with conspiracy and collusive action to fix and maintain delivered price quotations and to restrain competition.

Acting on a motion filed by the respondent and statements by counsel supporting the complaint, the Commission found that the Phoenix Iron Co. has sold all its steel-producing facilities and has ceased to engage in the production of steel. The order notes that the corporation has withdrawn its membership in the American Iron & Steel Institute and that it does not presently intend to resume the production of steel.

TCI&R Plans Continued Use of High Grade Ores

Birmingham

• • • **The Tennessee** Coal, Iron & Railroad Co., which has been blending iron ore from Sweden and Brazil with local ore of lower metallic content, has purchased ore from the Oliver Iron Mining Co., Duluth.

Robert Gregg, TCI president, said high-grade ore from the Gogebic range of Ironwood, Mich., would supplement the foreign ores.

"Last year," Mr. Gregg said, "the Tennessee Company purchased and used in its steel-making processes a considerable quantity of high-grade iron ore from Sweden and Brazil. The use of this ore, blended with our local Red Mountain ore, enabled us to produce more steel than would have been possible through the use of local ore alone.

"This operation, accomplished at obviously additional cost to the Tennessee Company, was undertaken in order to help us meet the critical need for steel throughout our trade territory.

"**Recognizing** the continuing necessity for a high rate of steel production, we now plan to continue this practice to a greater degree this year. We will continue to bring in iron ore of high metallic content from Sweden and Brazil, mostly through the port of Mobile. In order to supplement these foreign ores, which are limited both as to supply and ocean transportation, the Tennessee Company will bring in a considerable tonnage of high-grade ore from the Gogebic range of Ironwood, Mich.

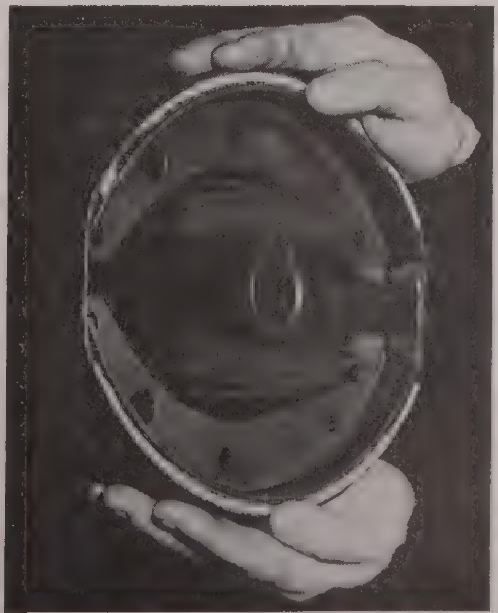
"As stated last year when we began to purchase richer ores from Brazil and Sweden, this step in our steel-making processes has no bearing upon our abundant supply of iron ore in this community. Our reserves here are sufficient to last for many, many years, and we shall continue our present high rate of mining operations on Red Mountain."

Declares 40¢ Dividend

Cleveland

• • • **Directors, Cleveland** Graphite Bronze Co., declared a dividend of 40¢ a share on common stock and the regular quarterly dividend of $1.25 a share on 5 pct preferred stock, Feb. 18. Both dividends are payable Mar. 10 to stockholders of record Feb. 28.

Ben F. Hopkins, chairman of the board, reported that preliminary figures indicated that profit for 1948 was $3,064,000, equivalent to $4.61 per common share, and the highest in the company's history.



BONDED LINING. *In its 1949 model passenger cars and light trucks, Chevrolet will use bonded brake linings instead of riveted linings. The linings are assembled inside a pressure band. Shown here is the spring method used to apply pressure between the lining and the brake shoe prior to baking. The brake shoes are baked at temperatures up to 400° for 56 min. (See Assembly Line, p.* 118)

Steel Unions Seeking New Rates on Federal Jobs

Washington

• • • **United Steelworkers of America** told the Labor Dept. last week that higher minimum wage rates should be set for employment under the Walsh-Healey Public Contracts Act.

Otis Brubaker, USW research director, asked the department to set a minimum rate of $1.23 per hr in the North and $1.08½ per hr in the South. He also asked a subminimum rate of $1.18½ per hr in the North and $1.04 per hr in the South.

Brubaker said that USW is not asking for increases, but is attempting to force the "stragglers" to come up the going industry scale.

But steel industry representatives expressed concern that the requested subminimums would, if put into effect, be eventually wiped out in favor of the prevailing $1.23 per hr and $1.08½ per hr minimums.

R. Heath Larry, general attorney for the U. S. Steel Corp. of Delaware, characterized the USW petition as "an untimely maneuver" that should be deferred pending clarification of the economic picture. Counsel for the Alan Wood Steel Co. said that without the lower rate the company could not afford to bid on government contracts, and might have to forego its participation on the voluntary steel allocation plan administered by the Commerce Dept.

Appointed to NBS Staff

Washington

• • • **Dr. Hans Kohler,** formerly a member of the Research Laboratories of the Signal Corps, has been appointed to the staff of the National Bureau of Standards, where he will be concerned with theoretical work in the Electronics Div.

Dr. Kohler has conducted extensive investigations in the very-high-frequency range, including antenna, wave propagation, transmitter and measurement problems. He also has worked in the field of decimeter waves on early split-plate magnetrons. He is a member of the Institute of Radio Engineers and has published a number of technical papers in the field of electronics.

Develops New Pulley

Milwaukee

• • • **Stearns Magnetic** Mfg. Co., Milwaukee, reports it has developed a new permanent magnetic pulley which requires no electrical current. This self-energized unit is designed to remove scrap iron from materials and to separate magnetic from nonmagnetic products. It will be made in more than 50 different sizes.

Coming Events

Mar. 4.........**Assn. of Steel Distributors,** annual meeting, New York.
Mar. 8-10......**Society of Automotive Engineers,** passenger car, body and production meeting, Detroit.
Apr. 4- 6......**American Gas Assn.,** distribution, motor vehicle and corrosion conference, Cincinnati.
Apr. 5- 6......**Metal Powder Assn.,** annual meeting, Chicago.
Apr. 8- 9......**Lead Industries Assn.,** annual meeting, Chicago.
Apr. 11-12......**American Machine Tool Distributors' Assn.,** spring meeting, Savannah, Ga.
Apr. 11-12......**American Zinc Institute,** annual meeting, St. Louis.
Apr. 11-14......**National Assn. of Corrosion Engineers,** annual conference and exhibition, Cincinnati.
Apr. 11-15......**Western Metal Congress and Exposition,** Los Angeles.
Apr. 18-20......**Midwest Power Conference,** Chicago.
Apr. 18-20......**American Institute of Mining & Metallurgical Engineers,** annual conference of Openhearth Steel Committee, Chicago.
Apr. 19-20......**Magnesium Assn.,** annual meeting, Chicago.

Japanese Taking Bids On 400,000 Long Tons Of Heavy Coking Coal

Washington

• • • **The Japanese Board** of Trade has announced its intention to purchase 400,000 long tons of heavy coking coal, according to the Office of International Trade. Sealed bids to supply the entire amount or a minimum of 100,000 long tons must be received by the Board of Trade in Tokyo on or before Mar. 15.

To obtain consideration each bid must be accompanied by a $25,000 deposit, and the bidder must indicate both the f.o.b. and c.i.f. (cost, insurance, freight) prices at which he is offering to supply the fuel. Successful bidders will be required to establish bonds covering 20 pct of the value of their contracts.

The Board of Trade specifies that delivery of the coal must begin before Apr. 30, 1949, and that a minimum of 25 pct of the total tonnage covered by each contract must be delivered each 30 days until the contract is completed.

New Terne Coating Line

Gary, Ind.

• • • **A new continuous** terne coating line, which U. S. Steel claims produces a better quality sheet steel for the automotive and agricultural industries, is nearing full production at Gary sheet and tin mill of the Carnegie Illinois Steel Corp.

Terne coating is the applying of a thin layer of lead and tin to sheet steel to make the steel more corrosion resistant. The terne coated steel from the new line is used for gasoline tanks, filters, oil cans and miscellaneous auto parts.

The 260-ft line at this U. S. Steel subsidiary plant employs a new electrolytic pickling bath, which is said to be the first installation of its kind ever to be used in conjunction with the operation of such a production line.

The new terne line is out of the experimental stage and approaching its rated capacity. It is currently capable of coating coils up to 48 in. wide and weighing up to 48,000 lb in gages from 16 to 26 with eventual capabilities of processing somewhat lighter gages.

Federal Trade Commission Answers Congressional Committee On Freight Absorption Controversy

New York

• • • *Interest and controversy has surrounded f.o.b. mill systems of pricing, and the old basing point method eliminated by the steel industry last summer. Steel wants the legal right to absorb freight. The rigid steel conduit case is before the Supreme Court now. The entire question may be clarified by that court. If it isn't it will be up to Congress to pass legislation to legalize freight absorption which business calls the right to compete freely. The Iron Age reproduces the answers from the Federal Trade Commission to questions asked by the Senate Interstate and Foreign Commerce Committee. They came from Commissioner Davis of the FTC.*

• • • **The replies** to the following questions have been considered and approved by Commissioners E. L. Davis, Garland L. Ferguson and William A. Ayres. Commissioner Mason was absent from Washington and not available for consultation when the matter was considered.

Q 1. Was the Commission's Jan. 12, 1949 letter to the Chamber of Commerce of the State of New York intended to convey the impression, as reported in the press, that basing point systems and freight absorption are illegal only when used by conspiracy?

A. No, and it is difficult to see how such an impression could result from the letter, a copy of which is attached for your information. (See next page for copy of this letter).

Q 2. It is the official view of the Federal Trade Commission that delivered prices, zone prices and freight absorption practices are illegal only when adopted or employed by conspiracy?

A. No. There is nothing inherently or necessarily unlawful about delivered prices, zone prices, or freight absorption. However, there may be discriminations in any prices, and if these discriminations have monopolistic efforts or result in injury to competition within the meaning of the Clayton Act, they are illegal.

Q 3. Does the Federal Trade Commission oppose a practice employed by competing sellers which may have the effect of a conspiracy or monopoly, but which is not adopted or employed by a conspiracy and which does not result from monopoly by one seller or from two or more conspiring sellers?

A. We have not, in our experience, known of a practice engaged in by a group of sellers which produced the effects of a conspiracy or monopoly and yet did not involve a conspiracy or monopoly.

Q 4. Do you think that identical prices can result from competition as well as from conspiracy?

A. Yes.

Q 5. Do you believe that the mere fact that two or more sellers sell like goods at the same prices proves that they are conspiring to fix prices?

A. In the Commission's letter referred to by you in Question 1, it was stated, "Momentary identity of delivered prices in ordinary commercial sales is not regarded by the Commission as adequate evidence of a conspiracy. Price identity may be one element of proof of conspiracy, to be considered with other elements, and the weight to be given it depends upon the circumstances. Unvarying prices over a long period of time; identity of prices offered in sealed bids where there is no innocent basis for foreknowledge on the part of each bidder of what other bidders may offer; efforts to avoid price differences as, for example, withdrawal of lower prices offered through inadvertence or error; substantially simultaneous price changes; price rigidity in the face of changing market conditions; and similar factors, all directly related to the character and continuance of price identity, may so supplement a showing of identity as to establish an inescapable inference of conspiracy."

Q 6. In a speech in Denver on Dec. 28, 1949, the then-Chairman of the Federal Trade Commission, Mr. Freer, said the rule of the recent cases applied only to conspiracy situations. Is that the official view of the Commission?

A. In the speech by Commissioner Freer referred to in your question he said in part: "— the recent decisions apply only to situations in which there is organized monopoly and conspiracy to suppress and restrain competition." His remark obviously was intended to refer to the decisions rendered in the Cement Institute and Rigid Steel Conduit cases, and it is in accord with the views of the Commission.

Q 7. As recent cases, would you include the Cement and Conduit cases?

A. Yes.

Q 8. Do you believe the rules of those cases should only be applied to conspiracy situations?

A. Both the Cement Institute and the Rigid Steel Conduit cases were basically conspiracy cases, and the precedents established in those cases are, in my opinion, applicable only in "conspiracy situations."

Q 9. Is the practical effect of the Commission's order in the Rigid Conduit case to require f.o.b. mill selling in that industry?

A. No. It was intended, however, to have the practical effect of preventing the respondents in that proceeding from continuing to use the basing-point pricing system which had been established and maintained by conspiracy, or from substituting for it the industry-wide use of any other pricing formula which produced the same result, and thus nullifying the effect of the proceeding.

Q 10. Is the practical effect of the Commission's order in the Pittsburgh-Plus case to require f.o.b. mill selling by the parties to that suit?

A. It seems to me quite clear that the practical effect of the order in the "Pittsburgh-Plus" case does not require f.o.b. mill selling. When the sellers' market in steel comes to an end, it will be surprising if the parties affected by that order do not abandon rigid f.o.b. mill pricing methods.

Q 11. In your opinion, is Count II of the Conduit case and the Commission's order under that Count limited to conspiracy situations?

   a. (If answer is "Yes")—How do you explain the fact that two of the respondents who were charged with conspiracy under Count I of the complaint were acquitted of the charge of conspiracy and dismissed out of the conspiracy count, but were nevertheless found guilty under Count II of following the same course of action as the others?

   b. (If answer is "No")—How do you reconcile that statement with the statement in Denver of former Chairman Freer that the Conduit case only applies to conspiracy situations?

A. In my opinion, the second count of the Conduit case is not susceptible of application except in "conspiracy situations." The legal theory of that count charges a practice followed by each of a group of sellers with knowledge by each that the same practice is being followed by all other members of the group, as well as with knowledge of the results of the common use of the practice, and that those results are in fact the restraint and suppression of competition. The facts of record in

Mr. B. C. Davis, Jr.,
Secretary, Chamber of Commerce of
the State of New York,
65 Liberty Street,
New York, N. Y.

Dear Mr. Davis:

This will acknowledge receipt of your telegram of January 6, 1949, copy of which was sent to each Commissioner, in which you requested answers to six questions stated therein, as follows:

1. Does the Commission regard single or multiple basing point systems as illegal if practiced by one concern?

It is the Commission's view that the law permits a single enterprise to use any pricing practice it may choose, including the quotation of delivered prices computed from one or more basing points, unless that practice involves price discriminations which injure competition within the meaning of the Clayton Act. Though for particular industries and pricing practices a seller should be able to forecast the likelihood of unlawful discrimination with reasonable accuracy and to check his forecasts by watching complaints which he receives, nobody can foretell for all situations in all industries that a given pricing practice, such as quotation of delivered prices computed from a basing point, will or will not produce unlawful discriminations.

2. If a single or multiple basing point system be used also by competitors what evidence does the Commission regard as sufficient to establish that there is a conspiracy in restraint of trade?

To answer this question with precision is no more possible than to state for any other breach of law all the various combinations of fact which may be convincing under particular circumstances. Though circumstantial evidence alone is seldom used to prove a monopolistic conspiracy, the Supreme Court has recognized in the tobacco case that such evidence may be sufficient if its cumulative effect is adequately convincing. Momentary identity of delivered prices in ordinary commercial sales is not regarded by the Commission as adequate evidence. Varying degrees of weight, according to the circumstances, are given to such matters as the following: enduring uniformities of prices; uniformities in the timing and the amount of price changes; consistent use of price formulas which have the effect of determining for each delivery point which enterprise or enterprises shall initiate price changes and of confining other enterprises to the role of accepting and matching these changes; efforts by producers of superior goods to conceal rather than to emphasize the elements of superiority in their products; disciplinary measures taken against persons who do not use the customary price formulas or who quote unusually low prices; habitual computation of delivered prices by the inclusion of transportation or other cost elements greater than those actually incurred; substantial and recurrent shipments of goods from deficit areas to surplus areas; habitual quotation of identical prices in sealed bids or under other circumstances in which advance knowledge of the prices to be quoted by competitors is not readily available; habitual readiness to accept substantial reductions of sales volume rather than reduce prices slightly below those of other sellers; sustained success in maintaining price discriminations so extreme that buyers who pay the high prices would not do so if they could find an alternative; and common use of conventional formulas, books of reference, or computing services which give precision to elements of cost or to terms of sale which might otherwise vary. In listing these attributes of a price structure, the Commission does not intend to exclude others which may be significant in particular cases. According to its published Rules of Practice, the Commission determines whether or not a conspiracy exists from the greater weight of all evidence in the record of the particular case.

3. What does the Commission regard as conspiratorial in price fixing with respect to the inclusion or exclusion of freight charges?

The meaning of this question is not clear to the Commission. It is possible for business men to conspire about the charges which they would make for transportation just as it is possible for them to conspire about any other charge. When the basing point formula is used as the instrument of a price-fixing conspiracy it includes all the elements necessary to bring about identity of delivered prices at all delivery points and these elements cover many matters in addition to the question whether or not freight charges shall be included in the delivered price. The manner in which charges for transportation are made would constitute facts that the Commission would consider in conjunction with all other facts in the record before it in determining the presence or absence of conspiracy.

4. To what does the Commission regard mill-f.o.b. pricing as evidence of collusive price fixing?

This question was apparently garbled in transmission. Presumably it was intended to read as follows: "To what extend does the Commission regard f.o.b. mill pricing as evidence of collusive price fixing"? The answer is that the Commission has not yet encountered an instance in which members of an industry conspired to fix prices through the observance of an f.o.b. mill pricing formula and that in the Commission's opinion such a formula would be an awkward and probably ineffective device for use in a price-fixing conspiracy. However, there may be cases in which an f.o.b. mill formula would be an effective part of a price-fixing conspiracy - for example, in a situation in which all producers are located at the same point.

5. When is mill-f.o.b. pricing free from a charge of conspiracy in restraint of trade, and when not?

No pricing formula - neither f.o.b. mill pricing nor any other - is automatically free from or automatically subject to a charge of conspiracy. The question before the Commission in considering the record in any such case is whether or not a conspiracy actually exists. Whether or not a particular formula or instrument was used to give effect to conspiracy is an incidental matter. However, some pricing practices are easier to use for price-fixing purposes than are others. Basing point practices can be readily used for price fixing and are hard to maintain over long periods of time without conspiracy. As indicated in the answer to Question 4, f.o.b. mill practices appear to be capable of use as effective instruments for price fixing only in special cases.

6. Does the Commission favor imposition of mill-f.o.b. pricing?

The Commission does not advocate the imposition of a requirement that business enterprises price their goods f.o.b. mill or that they use any other form of geographic pricing practice. In the Commission's opinion, one of the principal virtues of the anti-trust laws is the fact that they maintain freedom of choice and variety of behavior among business men, forbidding only the specific practices and conditions which have been condemned by law as destructive of competition.

By direction of the Commission. Very truly yours,

D C Daniel

D. C. Daniel,
Secretary.

the Conduit case were such that the Commission might have elected to include Spang-Chalfant and Clifton Conduit in the order under the first count. Both had knowledge (or such knowledge could reasonably be imputed to them) of the origin and purpose of the practices adopted and followed by them. Since I view the second count of the Conduit case as, in practical effect, equivalent to a conspiracy, although the word "conspiracy" is not used, I see nothing inconsistent in dismissing the first count as to these two respondents and including them in the order under the second count. The character of their participation and the proof concerning it conformed more precisely to the second count than to the first count.

Q 12. *Do you know that the Commission proposed to limit the Steel Company in absorbing freight to individual cases, to meet individual competitive situations?*

A. I do not. I am not aware that in negotiations between counsel, Commission counsel proposed to counsel for respondents a provision which stated in substance that nothing in the Commission's order or in the decree to be issued should prevent respondents from meeting in good faith equally low prices of their competitors in particular instances or transactions growing out of individual competitive situations, provided this did not involve a sales system constantly resulting in respondents securing higher prices from some customers than from others, and did not involve a general synchronization of respondents' mill prices to reflect a systematic equalization of their delivered prices with the delivered prices of their competitors as set out in the findings as to the facts in that proceeding, and did not involve injury to competition among respondents' customers as shown in such findings. Respondents' counsel did not agree, and such a provision was not included in the decree.

In large numbers of proceedings, Commission counsel negotiate with counsel for respondents with respect to many matters which may arise. Such negotiations rarely come to the attention of the Commission unless and until agreement between counsel on both sides is reached. Such agreements on the part of the Commission counsel are usually conditioned upon recommending that the Commission accept the agreement and are presented to the Commission for consideration and acceptance or rejection.

Q 13. *I show you a letter from the Chairman of the Commission to this Committee stating that the Commission offered the Steel Company only that limited right to meet competition, and ask you if that letter expresses the official Commission policy?*

A. This letter contains the text of a provision which Commission counsel proposed to counsel for respondents substantially as set out in the answer to the preceding question. The proposal was not accepted and, consequently, the Commission did not receive or consider it. The Commission policy is stated in its notice to the staff of October 12, 1948, in which it was said:

> Accordingly, it (the Commission) will not question such differences in the prices of a single enterprise as are merely designed to meet the readily foreseeable competition of a competitor where such differences involve no tendency to create a monopoly or eliminate price competition, nor will it question reciprocal price reductions similarly designed where their scope is not such as to preclude variety of delivered prices and raise the problem of collusion.

Q 14. *To what extent does the Federal Trade Commission treat identical prices as proof of conspiracy?*

A. In any case where conspiracy to fix prices is charged, evidence of price identity is one factor to be considered in determining the issue of conspiracy. Under different circumstances identity of price may differ greatly in probative value. Hence, it is not practicable to state abstractly the weight to be attached to evidence of price identity in such a conspiracy proceeding. The weight would depend upon such facts as those expressed in my answer to Question 5, and in the letter referred to in your first question.

Q 15. *Does the Commission regard knowing parallel conduct, having the effect of conspiracy—but not resulting from conspiracy—as being illegal under the Federal Trade Commission Act?*

A. The Commission regards as an unfair method of competition conduct where each of a group of sellers follows a particular practice with knowledge that the others are following the same practice, each with knowledge of the effects of the common use by the group of the practice, and in fact the practice as thus used results in restraint or suppression of competition. Whether one chooses to call this a conspiracy or not, the fact is that it contains all the elements of conspiracy under long-established and well-recognized interpretation of law.

Q 16. *Has Walter Wooden been the Commission's principal attorney in basing point and freight absorption matters?*

A. Mr. Wooden has been Associate General Counsel in charge of appellate matters since October 1946. In that capacity and in certain special cases for several years before that, he has briefed and argued all the cases in the United States Circuit Courts of Appeal in which the Commission's orders were being challenged involving some form or formula for delivered prices which was being used to injure or prevent competition either among the sellers of the commodity or among the customers of a single seller. He has participated in briefing and arguing two of such cases before the Supreme Court where he appeared in conjunction with the United States Solicitor General's office. He was in charge of the trial and presentation of the Cement Institute case before the Commission. He did not try or brief before the Commission any of the other cases of this description which were reviewed by the courts. No other attorney of the Commission has had as broad experience in the appellate handling of such cases.

Q 17. *For how long a time has he participated in that type of litigation for the Commission, in what cases has he been active, and to what extent has he participated in forming policy in this field?*

A. Mr. Wooden began the trial of the Cement case in 1937 upon issuance of the Commission's complaint. That was the first case of this sort he had tried. He did not draft the complaint, that function having been performed before Mr. Wooden's connection with the case by an attorney no longer with the Commission. The other cases in which Mr. Wooden has represented the Commission in the courts are generally described in the answer to the preceding question and they are listed as follows:

Salt Producers Association v. *Federal Trade Commission*, 134 F. 2d 354
A. E. Staley Mfg. Co., et al. v. *Federal Trade Commission*, 144 F. 2d 221; 324 U. S. 746
Corn Products Refining Co. v. *Federal Trade Commission*, 144 F. 2d 211
Triangle Conduit & Cable Co., Inc., et al. v. *Federal Trade Commission*, 168 F. 2d 175
U. S. Maltsters Association v. *Federal Trade Commission*, 152 F. 2d 161
Milk & Ice Cream Can Institute v. *Federal Trade Commission*, 152 F. 2d 478
Fort Howard Paper Co., et al. v. *Federal Trade Commission*, 156 F. 2d 899.
Allied Paper Mills, et al. v. *Federal Trade Commission*, 168 F. 2d 600
United States Steel Corporation, et al. v. *Federal Trade Commission*, No. 6795, Third Circuit Court of Appeals

The nature and extent of Mr. Wooden's participation in the development of the law in this group of cases is indicated by his briefs and arguments in formal adversary proceedings. He has also participated with other members of the staff in preparing certain factual reports on the operation of the basing-point system in the steel industry for the information of the Senate and the President. He had nothing to do with similar reports relating to the Cement Industry.

The complaint in the Cement case was issued after extended consideration of the policy questions involved, not only among the five Commissioners but also in conferences with the Attorney General, who recommended that this type of complaint be brought and indicated his belief that the Commission was the proper agency to bring relief.

As to the extent to which Mr. Wooden has participated in forming policy in this field, it should be stated at the outset that Commission policy on any matter is represented by the majority views of the Commission. Mr. Wooden, as the principal attorney handling cases in this field, naturally brought his views before the Commission on many occasions in connection with those cases. It is impossible to state retrospectively to what extent these views may have influenced the final decisions by the Commission.

Q *18. On Jan. 11, 1949, over a national radio hookup, Mr. Wooden opposed all freight absorption on a systematic basis. Is that the official view of the Commission?*

A. On the occasion referred to, Mr. Wooden stated that he was opposed to freight absorption "on a systematic regular scale which amounts to price fixing" and that "the basing-point system has been proved to the satisfaction of the courts in case after case to be a handy instrument for fixing prices and destroying price competition through systematic freight absorption." Mr. Wooden made it clear that these were his personal views and did not purport to express official views of the Commission. The Commission view is that freight absorption becomes unlawful only when done pursuant to agreement or conspiracy, or when done in a discriminatory manner which tends toward monopoly or substantially to lessen competition.

Q *19. What does the Commission mean by the use of the word "systematic"?*

A. It is my understanding that when the Commission has applied the word "systematic" to delivered pricing matters it has used the word in the following sense, which is to be found in Webster's New International Dictionary, Second Edition:

> Carried on, or carrying out a design, with thoroughness, regularity, or, sometimes, inveteracy; as, systematic efforts, attacks, intrigues, or intriguers.

Q *20. Mr. Wooden also then said he favored f.o.b. mill selling for everyone. Is that the official view of the Commission?*

A. Mr. Wooden stated on the same occasion that his personal attitude on the question of f.o.b. mill selling was to be distinguished from that of the Commission and that in his opinion the law does not require f.o.b. mill selling. The Commission announced its views on this matter in the letter referred to in your first question, as follows:

> The Commission does not advocate the imposition of a requirement that business enterprises price their goods f.o.b. mill or that they use any other form of geographic pricing practice. In the Commission's opinion, one of the principal virtues of the anti-trust laws is the fact that they maintain freedom of choice and variety of behavior among business men, forbidding only the specific practices and conditions which have been condemned by law as destructive of competition.

Q *21. Did the Commission officially authorize Mr. Wooden to participate in that program?*

A. The Commission expressed no objection to Mr. Wooden's appearance on the radio program subject to the payment of his expenses by those who invited him and subject to the provision that it be made clear that he was expressing his personal views as distinguished from Commission views.

Q *22. Do you know that Mr. Wooden believes that all industry should be required to sell at f.o.b. mill prices, and so testified before this Committee last November?*

A. Mr. Wooden testified before your Committee on November 18 last with regard to a proposed requirement that all industry should be required to sell at f.o.b. mill prices as follows:

> I say that that would be a theoretical ideal, that it is probably beyond the present range of probability. I would much prefer to see the law as it is now written on the statute books confirmed and enforced before we borrow any more trouble by going off into this theoretical discussion we have now been engaged in.

Accordingly, I do not now know that Mr. Wooden believes, as your question states, that all industry should be required to sell at f.o.b. mill prices, or that he so testified before your Committee last November.

Q *23. For how long have you personally known that Mr. Wooden has believed that all industry should be required to sell at f.o.b. mill or factory prices?*

A. In the light of his testimony as above quoted, and to which you referred, I do not now know that Mr. Wooden believes all industry should be required by law to so sell.

Q *24. Has the Commission ever instructed Mr. Wooden that he was not to make arguments in courts upon his personal views and which might lead to decisions that might be construed as requiring f.o.b. mill pricing?*

A. I believe that Mr. Wooden's briefs and arguments were confined to the issues raised by the pleadings, the evidence, and the order in each case, and that in no such case was there an issue whether the law requires any concern to sell f.o.b. mill. Accordingly, the question has never arisen whether the Commission should give any such instructions.

Q *25. Did you, or as far as you know any other Commissioner, read Mr. Wooden's brief in the Pittsburgh-Plus case before it was filed, or review his oral argument in the Cement case before it was made?*

A. So far as my knowledge goes, the answer is "No."

Q *26. Do you know that if the views in his brief in the Pittsburgh-Plus case and in his argument in the Cement case were adopted by the courts it would require f.o.b. mill pricing?*

A. I do not know that. Mr. Wooden himself denies that such an interpretation can properly be placed upon his arguments. However, these arguments are not controlling, whatever may be their meaning. The only basis for determining what has been required by the Commission is to be found in the terms of its orders to cease and desist as interpreted in the light of its findings of fact, the evidence, and pleadings in the particular case. None of the Commission's orders has been interpreted by it or by the courts as requiring only f.o.b. mill selling. In the Cement Institute case the Supreme Court said in part:

> Most of the objections to the order appear to rest on the premise that its terms will bar an individual cement producer from selling cement at delivered prices such that its net return from one customer will be less than from another, even if the particular sale be made in good faith to meet the lower price of a competitor. The Commission disclaims that the order can possibly be so understood. Nor do we so understand it.

Q *27. In 1936 a member of the Commission delivered a statement on behalf of the Commission to a Senate Committee in which he said, it is a matter of policy for Congress to determine whether basing point systems should all be outlawed. Is that still the official position of the Commission?*

A. The extension or contraction of the prohibitions of existing law is of course a matter of policy for the Congress. The Commission has been guided by a view similar to that expressed by the Supreme Court in the Corn Products case; namely, that the legality or illegality of a basing-point system is to be determined by applying the general standards set forth in the Federal Trade Commission Act and the Clayton Act. In the Corn Products case the Court said of the Robinson-Patman amendment to the Clayton Act:

> We think this legislative history indicates only that Congress was unwilling to require f.o.b. factory pricing and thus to make all uniform delivered price systems and all basing point systems illegal *per se*. On the contrary we think that it left the legality of such systems to be determined accordingly as they might be within the reach

of Section 2 (a), as enacted, and its more restricted prohibitions of discriminations in delivered prices.

Q *28. Do you think that Congress should outlaw freight absorption in the absence of a conspiracy?*

A. No. When used in a manner which is not illegal under present law, freight absorption may permit interpenetration of markets and tend to promote competition.

Q *29. What objection would you have to legislation which made all conspiracies illegal and permitted freight absorption in the absence of a conspiracy?*

A. Since conspiracy is now unlawful, legislation is not necessary to make it so. My principal objection to legislative permission for freight absorption in the absence of a conspiracy is that it would set the stage for discriminatory freight absorption which would permit a large and financially strong seller to oppress and perhaps destroy his smaller competitors, and would permit powerful buyers, particularly mass distributors, to secure unjustly discriminatory advantages from sellers which smaller buyers who competed with them could not secure.

Q *30. Has the Federal Trade Commission ever brought a case against anyone for absorbing freight, or using a basing point system, or having uniform delivered prices, when it did not charge and believe there was a conspiracy?*

A. Yes. *Federal Trade Commission v. Staley Manufacturing Company, et al.*, and *Corn Products Refining Company, et al. v. Federal Trade Commission.* In the Staley and Corn Products cases, brought on charges of price discrimination under the Clayton Act as amended, the Commission did not charge a conspiracy. However, the discriminations in price found in those cases, which were so great as to raise questions how they could persist under competition, may have been due to conspiracy. For, in 1932 the respondents in these cases consented to a decree in a Sherman Act case involving the charge of price fixing, and in 1947 the Commission found it necessary to include these respondents with others in a proceeding now pending in which a price-fixing conspiracy is charged.

Q *31. Has the Federal Trade Commission ever entered an order against any one in a freight absorption, delivered pricing, or basing point case, when it did not find there was a conspiracy?*

A. Yes. In the cases referred to in the answer to the preceding question.

Q *32. Do you know of any case in which such pricing systems or practices are being used, and should be prohibited by law, where there is not a conspiracy as that offense has been described in the Interstate Circuit and American Tobacco cases?*

A. Where such pricing systems are used as means of establishing or maintaining a monopoly, they are, and in my opinion should be, unlawful whether or not there is a conspiracy. If price discriminations appear in such pricing systems in such form and degree as to substantially lessen or injure, destroy, or prevent competition or tend to create a monopoly, they are unlawful whether or not there is a conspiracy. In my opinion they should be.

The two cases mentioned in the reply to question 30 were based upon such price discriminations, without allegation of conspiracy. So was the Pittsburgh-Plus case. I cannot cite instances other than those included in past complaints and orders; for until enough information is available to justify a complaint, the facts are too uncertain to justify me in saying that the situation calls for legal remedy.

Q *33. Do you see any reason beneficial to the country why sellers who are not conspiring should not be permitted to absorb freight?*

A. Freight absorption may be an innocent or even beneficial practice. It may be harmful, not only when it is incident to a conspiracy, but also when it is an instrument for a monopolistic purpose or when it produces price discriminations that injure competition. The law should not and does not either expressly condemn or expressly sanction freight absorption, but should and does treat it like other trade practices, which, in the absence of conspiracy, are lawful unless they have an unlawful purpose or effect.

Q *34. In your opinion, does the Clayton Act limit a seller's right to meet competition to doing so in individual cases, to meet individual competitive situations, and where doing so does not injure competition?*

A. Price differences which appear merely through a seller's action in meeting competition in good faith are not likely to injure competition. In the absence of such injury, nothing in the Clayton Act prevents a seller from meeting competition as widely and as often as he chooses. In the rare case in which such injury appears in spite of the fact that the seller was merely meeting the equally low price of a competitor in good faith, the scope and frequency of the seller's price reductions do not affect the legality or illegality of the discrimination. Such scope and frequency may be relevant to a case, however, as evidence bearing upon the question whether or not discriminations are properly attributable to meeting competition in good faith.

Q *35. Is the view you have just expressed the official view of the Commission?*

A. Yes.

Q *36. Do you think that promoting real competition requires that a seller who is competing—and not conspiring—with other sellers should be permitted to meet his competitor's prices when he does so in good faith?*

A. Yes. See the answer to question 39.

Q *37. Does the Clayton Act permit sellers to meet competition in good faith?*

A. In the ordinary case, the answer is yes, since ordinarily competition is not injured by this type of discrimination. As to the rare instance in which an injury to competition appears, the interpretation of the statute is squarely before the courts in the Standard Oil Case, in which decision is now pending.

Q *38. Do you believe that meeting competition* in good faith *should be a defense to a charge of price discrimination under the Clayton Act?*

A. Yes.

Q *39. Where a seller in good faith reduces his price to meet the lower price of a competitor, do you believe he should be permitted to meet that lower price, when he does so in good faith, even if his doing so may cause an injury to a competitor, or to a competitor of his customer?*

A. Yes. If good faith is present, injury to competition will be rare; and in general the policy of the law should not discourage active competition by preventing the meeting of the competition in good faith.

Q *40. Corwin Edwards, Walter Wooden, Lynn Paulson and Allen Phelps all testified before this Subcommittee last November and December. While they agreed on some things, each one of them disagreed with the others on one or more points. Was any one of them expressing the official views of the Commission?*

a. Which one of them is the Committee and the public to believe?

A. The four persons named were selected and invited to testify by your committee, and the Commission was not consulted about their selection. Each of them informed the committee at the outset of his statement that he was expressing his own views and not the official views of the Commission. The Commission did not see all of the statements before delivery, and thought it improper to suggest any change in any of them. None of the statements is to be regarded as expressing official views. Such views are set forth only in the Commission's findings and orders, in statements issued in the name of the Commission by a majority of the members, or in statements made by an individual by direction of the Commission. The Commission regards differences of opinion among staff members and even among Commissioners as a normal incident of the development of policy and of the interpretation of law; and believing that responsible interpretations of public questions contribute to the understanding thereof, the Commission is unwilling either to require all staff members to express only its official views or to muzzle all staff members who think for themselves.

In the present instance, the extent of the difference of opinion among three of the four persons named is much narrower than has been indicated in some of the recent statements which have come to the Commission's attention. It is my understanding that Mr. Edwards and Mr. Wooden differ in opinion about the ultimate desirability of f.o.b. mill pricing, but do not differ in any important respect as to the practices which are now forbidden or permitted under the present law or as to the policies which the Commission should follow under this law. Interpretations of technical points of law in most of Mr. Edwards' speeches have been checked for accuracy by Mr. Wooden before delivery. Mr. Paulson differs from both of the others in his interpretation and appraisal of Count II of the Conduit case but not significantly in other respects. Mr. Phelps, who differs substantially with the other three, has never participated either in the conduct of any of the Commission's delivered price cases or in the formulation of the Commission's policy toward such matters.

Q 41. *Do you think there is now doubt among businessmen of the right to absorb freight in the absence of a conspiracy?*

A. I think there was a good deal of confusion last summer and that, though it is rapidly diminishing, there is still some; but I think that the original confusion was enhanced by propaganda, that the Commission's statements have removed much of it, and that any significant remnants can be similarly removed. Two of the matters involving freight absorption about which uncertainty and alarm are most frequently expressed are Count II of the Conduit case and the question raised by the Standard Oil case about the adequacy of the defense of meeting competition. As to the former, the Supreme Court will soon speak and as to the latter there will soon be a circuit court decision. The current speculation about the scope of the prospective judicial opinions in these cases is similar to that which prevails while any point of law is being decided in the courts. It is, therefore, premature to say that the law as to these matters requires Congressional clarification.

Q 42. *Do you think there is now any doubt among businessmen as to their legal right to meet in good faith the prices of their competitors?*

a. (If "yes")—Should Congress not clarify this question as quickly as possible?

A. The answer to the last question applies here also. However, the question has never been adjudicated as to whether or not, where injury to competition is shown, the meeting of competition in good faith is a sufficient defense, and uncertainty as to this matter is currently well-founded. This question is squarely raised in the Standard Oil case, which is now pending before the circuit court. When the courts have spoken, presumably this point will be clear. Unless the judicial process fails to clarify the law, I see no need for Congress to do so.

Q 43. *The National Military Establishment has written this Subcommittee in substance that while the military aspects of the basing point decision are not clearly discernible at the present time, eventually it may result in a tendency for consuming plants to move closer to their steel suppliers with increased concentration around the steel-producing centers. The Military also suggested that the decision might bring further concentration of industry in large consuming centers. I show you this letter from the National Military Establishment, dated Dec. 20, 1948, and ask you if you care to comment on their views with respect to this decision?*

A. As I read this letter, they find themselves uncertain whether the long run effect of the basing point decisions upon the steel industry will be (a) to increase concentration by drawing consuming plants to steel producing centers, or (b) to disperse the steel industry to the centers of consumption, and at the same time to enlarge these centers, or (c) to bring about no significant change in the pattern of industrial concentration; and they are unwilling to express any opinion at all as to other industries.

This letter should be compared with one addressed to Senator Wiley in September, 1948, by the National Security Resources Board, which concluded that the probable effect of the decisions will be to reduce industrial concentration. Both letters should be read with reserve, since there is a possibility that their conclusions are intended to indicate the probable results of rigid f.o.b. mill pricing, such as the steel industry has adopted. Since the law does not require rigid f.o.b. mill pricing, there is little probability that this practice will be generally adopted or even that it will remain the practice of the steel industry when a buyers' market returns.

The basing point decisions leave every business man free to use any pricing method he chooses, so long as it is not one which eliminates or injures competition. I presume that pricing practices will continue to vary from industry to industry and from company to company; and since I cannot predict what pricing practices will eventually be used by the industries involved in the basing point cases, I cannot foretell the effect of these practices upon the location of industry.

Under the basing point system, consumers located at a base could buy the commodity more cheaply than anywhere else, and consumers located near a non-base producer could obtain no price advantage from their location. Therefore, there was a tendency for consumers to concentrate at basing points, so far as the advantage of cheaper buying was not offset by other disadvantages. Where the basing point system is abandoned, a consumer who wants advantage from location near a producer is equally likely to get it by locating at the former base or near any of the producers who were formerly not at a base. Thus the tendency of the change is toward a greater dispersion of consuming plants.

Under the basing point system, a producer who was located far from a base enjoyed the advantage of phantom freight upon sales in his local market, and some small producers have sought out new locations in order to get this advantage. But such a non-base producer obtained a profit advantage only in nearby markets. He was under a severe handicap in selling toward the base. The producer located at the base, however, was able to sell throughout the base area without absorbing freight or encountering a price lower than his own, and thus managed to share the local markets of the non-base producers. Non-base producers tended to remain small, and most production continued to be concentrated at basing points. Where the basing point system is abandoned, artificial handicaps upon the growth of non-base producers may be expected to disappear, and special opportunity for basing point producers to sell throughout the basing point area may be expected to disappear also. The tendency of the change is to reduce the relative importance of basing point centers of production and thus to disperse productive capacity.

Q 44. *Have you examined the Johnson Bill, S. 236?*

A. Yes.

Q 45. *If the Supreme Court should affirm the Circuit Court's decision in the Conduit case, using the same language as to Count II as was used by the Circuit Court of Appeals, in your opinion, would there be a need for legislation by Congress on this subject?*

A. The effect of such an affirmation would be to leave in full effect the Commission's interpretation of Count II and of the corresponding order. As indicated in the answers to questions 8, 9 and 11, this interpretation means that the count would be a precedent only in conspiracy situations. I see no reason for the Congress to amend the law in this respect.

Q. *46. If the Supreme Court were to reverse the Circuit Court of Appeals in the Conduit case and order Count II stricken from the complaint, do you believe there would be a need for legislation by Congress giving the Commission additional powers to make its orders more effective?*

a. If the Commission is reversed as to Count II in the Conduit case, do you think that the second paragraph of Section 2 of this bill would be of considerable help to the Commission in the enforcement of its orders against price fixing conspiracies?

A. If the effect of the court's decision were to deny the Commission the right to issue orders similar to that under Count II and so to limit the Commission's orders in conspiracy cases that they merely forbid continuance of the conspiracy, there would be need for legislation to make orders in such cases more effective.

Section 2(b) of the bill, as now written, is so limited that in my opinion it would not contribute to this purpose. By setting the f.o.b. mill prices of non-base mills at the levels of the delivered prices which formerly prevailed at the locations of those mills, and by absorbing freight in appropriate amounts, producers subject to the type of order contemplated in this section could, in most instances, perpetuate the exact pricing pattern of the conspiracy without violating the order. The statute of limitations included in the section would be a new limit upon the Commission's enforcement powers.

Q *47. Is the power of the Commission under Section 5 of the Federal Trade Commission Act now limited to entering a cease and desist order?*

A. Yes.

Q *48. Would the Commission's ability to enforce the antitrust laws be strengthened if it had the power to enter an affirmative order to make more effective its effort to break up the conspiracy?*

A. Yes.

Q *49. In your opinion, would the second paragraph of Section 2 of this bill strengthen the powers of the Commission?*

A. No, for the reasons indicated in the answer to question 46.

Q *50. Is there anything in this bill that would make conspiracies easier to accomplish, more difficult to detect, or harder to prosecute?*

a. If so, what?

A. Yes. The proposed amendment of Section 5 of the Federal Trade Commission Act would have this effect. The respects in which the law would be weakened have been analyzed in the testimony of Mr. Dawkins and Mr. Sheehy before your Committee. Action against conspiracies would also be made more difficult by the definition of injury to competition proposed for inclusion in the Clayton Act since this definition does not include injury arising from agreements to discriminate, such as the Commission found in the Cement case.

Q *51. Do you agree with the statement in the December, 1948, Annual Report to the President of his Council of Economic Advisors, that: "The tendency toward soft competition has likewise been exhibited in the Robinson-Patman Act, which prohibits price-making policies previously accepted as legitimate features of hard rivalry for business"?*

A. Certain features of the Robinson-Patman Act appear to have that effect in particular instances. However, the principal purpose of the Act is to preserve the vigor of competition by protecting small business from price discriminations that give a decisive advantage to larger enterprises and thereby tend to promote monopoly. It should not be necessary to permit the discriminatory pricing practices used by the Standard Oil Company, for example, in building up its monopoly which eventually led to dissolution suits under the Sherman Act. The provisions of the Clayton Act offer an opportunity to checkmate such practices before the monopoly has been achieved.

Q *52. Assuming that the Congress desires to clear up the present confusion as to a seller's right to absorb all or part of the transportation costs, do you believe that legislation should be passed prohibiting freight absorption in all cases, or should legislation be passed permitting freight absorption whenever it is not used pursuant to an agreement or conspiracy among sellers?*

A. Either type of legislation would make a significant substantive change in existing law, and is therefore inappropriate if the Congressional intent is merely to clarify the law. The law as to absorption of transportation costs, like the law as to any other pricing practice, does not now make such practice lawful or unlawful *per se*. The practice becomes unlawful if it has an illegal purpose or effect—for example, if it is part of an attempt to monopolize trade or if the effect of the practice is a price discrimination that injures competition. The Congress can *clarify* (as distinguished from *modify*) the law only by saying this more clearly than it has been said in the existing statutes as interpreted by the applicable decisions.

Q *53. Assuming that the Congress desires to clarify the law with respect to transportation costs, do you believe that Congress should prohibit or permit competing and not conspiring sellers to have uniform delivered prices throughout the country?*

A. Either choice would modify, and not merely clarify, the law. At present uniform delivered prices, by which I assume the Committee means so-called postage-stamp pricing by any seller, are neither lawful nor unlawful *per se*, but may become unlawful if they are used with an unlawful purpose or have an unlawful effect. Neither monopolistic purpose nor injury to competition through price discrimination is likely to appear in this type of pricing practice; but in the unusual instance, the law should apply as fully as to any other pricing practice.

Q *54. It is my personal desire to have a bill which will strengthen the antitrust laws, clearly outlaw all conspiracies, and still permit competing sellers to absorb freight in whole or in part. I have said that S. 236 is not in perfected form. I would, like to know from you, assuming that the Congress desires to clear up the confusion as to the absorption of transportation costs, what provisions would you recommend be taken out of this bill and what provisions would you recommend be put in it, to accomplish the purpose I have just expressed?*

A. In spite of my personal view expressed before your Committee that legislation of the type contemplated is neither necessary nor desirable, I wish to comply with your request as fully as possible. Accordingly, I shall attempt an answer to this question based upon your statement of the objective to be achieved.

Sections 1, 2(a), and 3 of S. 236 seem to me to contain provisions which will weaken the anti-trust laws and will go much further than merely permitting competing sellers to absorb freight. I concur in the analyses of these sections which have already been presented to your Committee by Messrs. Dawkins and Sheehy of the Federal Trade Commission staff. Minor amendments will not be sufficient to eliminate the undesirable effects. A fundamental redrafting is necessary. The same comments apply to Section 4 of the bill in so far as parts (1) and (2) of subsection (g) are concerned. I see no objection to part (3) of subsection (g).

For reasons set forth in the testimony of Messrs. Dawkins and Sheehy, the powers proposed for the Commission in Section 2(b) of the bill need substantial revision if this section is to afford effective means of enforcement.

I am now considering what language would be appropriate to accomplish the purposes stated in your question 54 but drafts are not yet perfected. Accordingly, with your permission, I shall withhold this part of my answer to the question until I have had full opportunity to explore the possibilities of drafting legislation which will accomplish your purpose without impairing the effectiveness of the antitrust laws.

Transportation Obstacle In Venezuelan Ore Developments

Bethlehem and U. S. Steel Subsidiaries Take Lead In Bringing Ore Out

* * *

Caracas, Venezuela

• • • **Venezuela,** long regarded as a petroleum power, now is nearing its iron debut. Only the bottleneck of transportation inadequacies is holding up formal entry into an "Iron Age," sponsored by two U. S. steel company affiliates.

The main transportation grief is sandbars at the gaping mouth of the Orinoco. Soundings, made recently, show the river to be navigable at most points except at the heavily, sand-imbedded mouth which possibly will be dredged in the future. Other barriers have been the lack of any transportation facilities to connect Venezuela's several iron mountains, located in Estado Bolivar, with river transport.

Undaunted by the absence of such facilities, the Iron Mines Co. of Venezuela bulldozed the jungle distance from Palua (on the Orinoco) to El Pao, the mine site, and constructed a 35-mile, all-season road connecting these points with San Felix, the company headquarters. The firm, a subsidiary of Bethlehem Steel Co., also laced the area with rails from a 420-meter elevation at El Florero (El Pao mine) to Palua, at sea level. Lacking only a few missing parts before being completed, the rail line has eight loading platforms, four tank wagons, two private cars, one crane car and miscellaneous items for handling the contemplated four-trainload deliveries of ore daily.

To date, the firm has invested about $45 million in Venezuela, of which $35 million was spent on the El Pao and Palua installations. It is estimated fully $60 million will be invested before a token shipment of ore is made by the end of 1949. About $12 million has been spent in construction of a town and port at Puerto Hierro, rapidly nearing completion, in addition to the construction of a floating, all-metal dock on the Orinoco for receiving the ore.

Literally, the firm started from the ground up—it is an open cut operation—installing transportation facilities, two modern cities, and other items essential to the efficient performance of the mine, located on El Florero mountain, 600 meters above sea level.

Once the ore tested 65-72 pct purity, the firm started clearing the forestal camouflage from the mountain which is now harnessed with mechanical equipment. The practically completed, self-sufficient towns are El Pao and Palua, formerly an Indian village. Coincidentally, the 500 person population of San Felix has jumped to 3000 and Pozo Verde has sprung up half-way between El Pao and Palua.

Extraction of the ore from El Florero is not altogether a simple operation. After laborers displace hunks of the ore, four gigantic, electric shovels feed the material into tractor-drawn trailers. These shovels are capable of lifting a 3½ cu m load. Consigned to a crusher, considered the largest in the world, the material is reduced from 2 cu m blocks to pieces measuring 23 x 25 cm before it is taken to another crusher, nearer the base of the mountain. Here it is masticated to fragments measuring 6.5 cm and is loaded into one of 100 ore cars, 70-ton capacity each, for the 33-mile run to Palua.

Although the river port is at sea level, the ore is taken on a viaduct ascent for direct spill into subterranean shoots, feeding the river barges. Below the viaduct is a warehouse with a 35,000-ton capacity. It is estimated a single

THIS WAY OUT: *Construction work is shown underway on the railroad connecting Bethlehem's mine at El Pao with the river port at Palua. The line is 36 miles long.*

trainload (36 wagons) will transport 2500 tons of ore.

Barges, with 4000-ton capacity each, will be fed the ore and will be guided downstream by a towboat to Pedernales for reloading to larger vessels. Then the material will proceed to Puerto Hierro on the Golfo de Paria for reshipment in 24,000-ton-capacity ore vessels to Baltimore.

Since acquisition of exploitation rights to the 20,000-acre site in 1933, the firm has constantly increased the number of its employees until they now number 1300 Venezuelans and about 70 North Americans. The monthly payroll averages $20,000. The company anticipates a yearly production of 2 million tons of ore from El Florero, which has an estimated 70 million-ton reserve. Should the production figure reach 3 million tons, company officials predict a 25-year service.

But the iron reserves at El Pao are trifling compared to the several hundred million ton reserve at Cerro Bolivar (in the Meseta de La Parida hogback), under exploitation by Oliver Iron Mining Co. A subsidiary of U. S. Steel Corp., Oliver's operations are located 50 miles from Ciudad Bolivar, capital of Estado Bolivar.

Both La Parida and El Pao are a part of the east-west iron deposit belt in the Cierra Imataca region, south of the Orinoco River. This belt extends from the Orinoco to Upata and from the Rio Oro up to the Orinoco Delta (east-west)—possibly further but that area has not been studied due to its extreme isolation.

Confronted with the transportation problem since commencement of its exploitations 2 years ago, Oliver currently is studying the construction of a 55-mile railway to Ciudad Bolivar. At this point, possibly the ore will be diverted to Puerto La Cruz, following an overland journey, or to the mouth of the Orinoco where a canal is under study.

A complete story on U. S. Steel's interests in Venezuelan Ore appeared in THE IRON AGE, *Dec.* 30, *p.* 71—*Ed.*

Oliver also is making studies on exploration sites of 12,500 acres each at La Grulla (50 miles from El Pao), Monte Romero, Monte Bello and Monte Paraiso, all in the Estado Bolivar, and Monte Vista in the Territorio Federal Delta Amacuro. In conformity with the Ley de Minas of Venezuela, the firm has the right to extract, royalty exempt, 50 million metric tons of ore from a mine site with a royalty of 50 pct thereafter. The tax on all minerals, excluding diamonds and semi-precious stones, is 1 pct. The company has agreed to supply a minimum of 200,000 tons of ore yearly to the Venezuelan government 7 years after date of exploitation rights.

EXTRUDED TUBING: *R. W. Yancy, chief metallurgist of Fansteel Metallurgical Corp., shows a tube of pure molybdenum extruded from a special ingot by the company to Dr. F. H. Briggs, vice-president in charge of technical development. Fansteel claims that this is the largest tube of its kind in the world. It weights 9750 grams, is 2 in. O.D., has a ¼ in. wall thickness and is 43 in. long.*

The government of Venezuela has granted another concession to a Venezuelan firm, Cia. Hierro Reprasalias, for exploiting an estimated 10 million-ton reserve in the Delta Amacuro region. The latter is not presently exploiting the 65 pct-tested ore. In addition, the government is making further studies on iron deposits at La Rochela and San Isidro, which have ores analyzing 65 pct, and other regions in the northern zone of Piacoa which average 45 pct purity.

Almost simultaneous with entry into its Iron Age, Venezuela has promise of entering into its "Steel Age." The government sent a mission to Sweden to study steel methods. The mission has completed its technical studies and now is awaiting arrival of a North American mission to make economic studies before deciding upon a location. Speculation has located the government-subsidized installation at San Felix for proximity to a natural gas supply at El Temblador.

Meanwhile, the Siderurgica Venezolana (Sivensa) S. A., comprised of mixed U. S. and Venezuelan capital, has started foundations for a 20,000-ton yearly capacity plant in Antimano, a suburb of Caracas. The equipment will be installed by Arthur G. McKee and Co., Cleveland. Construction work is being handled by the Oficina Tecnica Gutierrez & Cia. Under the presidency of Miles M. Sherover, the firm expects to start production of both low and high quality steel products by July. All raw materials, obviously, will be secured from sources in Venezuela.

Announces Change in Name

New York

• • • **Net profit** of $1,000,858 for the first quarter of 1949 was reported to shareholders of International Detrola Corp. recently. Stockholders at their annual meeting voted to change the corporate name to Newport Steel Corp.

Marshall Plan Funds To Aid Research For New Mineral Sources

Washington

• • • **Two surveys** looking to new sources of minerals in British colonial areas, lagging since they were started in 1946, may be brought to completion more quickly through use of Marshall Plan funds.

The Economic Cooperation Administration has earmarked $1.5 million for salaries of technicians for the purpose. Great Britain has agreed to release nearly $1.7 million in pounds, from counterpart funds, to pay expenses.

One project calls for assignment of 19 American geologists, petrologists and 3 chemist-assayers to the British Colonial Survey for 3 years. The Americans would join various British groups in the colonial areas.

These include Nigeria, the Gold Coast, Sierra Leone, Uganda, Kenya, Borneo and British Guiana. Known to exist in these areas are iron and coal deposits, gold, tin, copper, lead, columbite bauxite, diamonds, manganese, chromite and other minerals.

In a second project, a group of from 24 to 30 geodetic engineers would be attached similarly to the Colonial survey force currently engaged in topographic mapping of large areas in Uganda, Kenya, Northern Rhodesia, Nyasaland and Tanganyika. These regions are known to contain deposits of copper, lead, tin, iron ore and other critical materials.

Arrangements are already under way by the U. S. Geological Survey, acting for ECA, for recruiting the qualified personnel for the two jobs.

Steel Production Drops

Calcutta

• • • **India's steel** output dropped considerably during the second and third quarter of last year. The decline is attributed to the breakdown of machinery at the works of the Steel Corp. of Bengal, which resumed normal production in September.

Steel production for the year is finally estimated at 825,000 tons. This compares favorably with the 868,580 tons made in 1947, which was a year of gross underproduction.

Steel demand for the country is estimated to be 2½ million tons annually under present conditions. This is double the country's steelmaking capacity and three times current production level.

35 Productivity Teams Slated for Visits Here

Washington

• • • **The first of** 35 productivity teams to come to the United States this year under the sponsorship of the Anglo-American Council on Productivity will be drawn from the steel foundry industry, according to the Economic Cooperation Administration.

It will consist of 12 to 15 members, and is expected to arrive in New York about March 14 and will be in the United States approximately 7 weeks to study production methods of the steel foundry industry here.

The British Steel Founders Assn., the Engineering and Allied Employers National Federation, and the Confederation of Shipbuilding and Engineering Unions will set up a joint committee to select members of the team.

Super Highway System Goes Before Congress

Washington

• • • **A self-liquidating** $10-billion superhighway system would be constructed over the next few years under terms of a bill in Congress sponsored by Representative Staggers, D., W. Va.

It would consist of two transcontinental highways running from Boston to San Francisco and from Jacksonville to San Diego; of two coastal routes, one from San Diego to Puget Sound and the other from New York state to Florida, and two cross-country stretches, one from Laredo to the Canadian border in Minnesota and the other from Jacksonville to the Great Lakes, presumably Chicago.

Dual roads would be constructed, one for passenger cars and the other for trucks and buses. Bonds would be sold for financing the construction and a toll system would liquidate the bonds and provide maintenance.

4,354,061 Net Tons Of Iron and Steel Exported During '48

Washington

• • • **A sharp rise** in iron and steel exports during December brought the total 1948 iron and steel export tonnage to 4,354,061 net tons, according to the Commerce Dept.

The December export tonnage was 422,191 net tons — almost double the volume shipped during November. The month's tonnage included 65,604 tons of tinplate and tagger's tin and 45,600 tons of black steel sheets.

Net tonnages of iron and steel exported during November and during the year 1948 are:

	December 1948	Entire Year 1948
Ingots, blooms, billets, slabs, sheet bars	16,318	219,197
Wire rods	2,938	38,195
Skelp	4,952	57,922
Iron bars	192	3,663
Concrete reinforcement bars	12,366	130,305
Steel bars, cold-finished	4,110	46,497
Other steel bars (excluding alloy)	35,381	309,476
Alloy steel bars	2,658	53,008
Welding rods, electric	1,855	15,837
Boiler plate	1,922	28,879
Other plates, not fab	27,058	319,043
Plates, fab, punched or shaped	1,509	23,555
Iron sheets, black	1,514	17,777
Steel sheets, black	45,600	416,121
Galvanized sheets	6,830	62,786
Strip steel, cold-rolled	6,314	59,484
Strip steel, hot-rolled	6,488	69,096
Tinplate and tagger's tin	65,604	604,972
Terne plate (incl. long ternes)	996	9,047
Structural shapes, plain	22,732	292,306
Structural shapes, fab	15,174	160,972
Frame and sashes	377	3,167
Sheet piling	2,361	34,525
Rails, 60 lb, per yard and over	32,302	265,820
Rails, less than 60 lb. per yard	993	9,717
Rails, relaying	3,833	32,837
Splice bars and tie plates	4,228	49,357
Frogs and switches	306	5,467
Railroad spikes	578	9,269
Railroad bolts, nuts, and washers	363	7,667
Car wheels, tires and axles	3,197	38,718
Seamless black pipe	1,827	20,694
Seamless casing and oil line pipe	24,860	225,830
Seamless boiler tubes	3,278	36,729
Welded black pipe	6,987	61,563
Welded galvanized pipe	5,212	41,763
Welded casing and oil line pipe	5,083	146,088
Welded boiler tubes	195	1,758
Other pipe and fittings	6,707	68,936
Plain wire	10,125	76,829
Galvanized wire	4,997	50,314
Barbed wire	4,499	39,793
Woven wire fencing	1,647	11,624
Woven wire screen cloth	605	5,740
Wire rope and strand	1,586	13,647
Wire nails	1,997	19,666
Other wire and manufactures	3,285	41,511
Horseshoe nails	32	432
Tacks	334	3,539
Other nails, incl. staples	1,096	10,952
Bolts, nuts, rivets and washers, except railroad	4,222	54,314
Forgings	2,530	27,066
Horseshoes	38	591
TOTAL	422,191	4,354,061

Rising Tempo of Southeastern Industry is Called

Level is Still Below That Of Other Sections But it Is Scoring Good Gains

° ° °

Birmingham

• • • **Changes in the** industrial and agricultural pattern of the Southeastern states are increasing their importance to steel producers and fabricators. The increase is relative because heavy industry plays a minor role in the Southeastern economy, but it is striking because it apparently indicates a rising trend.

Though per capita income in the Southeast is still below that of the rest of the country, it has been rising faster than that of the nation as a whole. Factory payrolls in 1947 were 12 pct above the 1944 figure in contrast with small increases or marked declines in other regions. While this figure chiefly reflects the lesser role of heavy industry in the Southeast, it does show the industrial growth there.

Gains in metalworking have been proportionally less than those in pulp, paper and textiles, but postwar developments indicate that metalworking plants are growing in importance. There are at least four reasons why they should: (1) Rising freight rates have dictated movement of some assembly plants to the Southeast; (2) higher living standards will permit more local manufacture and sale of metal products; (3) industrial growth calls for more construction steel, pipe, machinery, maintenance and service equipment, and (4) mechanization of agriculture means tractors, ploughs, fencing and allied products.

Specifically, what are some of the changes that are striking a new note in the Southeast? Atlanta, crossroads of the Southeast, boasts two new automotive assembly plants. Fisher Body has had a plant there for 20 years, employing about 1500 workers. Within the past year both Ford and Buick-Olds-Pontiac have opened new Atlanta plants, each employing about 1500 workers.

These plants are not steel consumers as such; they do no blanking, stamping, forming or machining. They buy a few parts locally, mainly upholstery items, including springs. Until now there have been few local metalworking plants capable of doing business with the automobile shops. Ford purchasing agents want assurance that other assembly plants besides Atlanta can be supplied; they want volume production at a price. Suppliers have hesitated to put in a lot of expensive equipment to get an order that might not be repeated.

But Ford buyers think they'll turn up some local sources. General Motors buyers are less optimistic; they say the area has a long way to go to approach Detroit. Local men won't argue this, but if there were any assurance of enough business to justify a heavy capital investment with a reasonable risk they say more parts would be produced in Atlanta.

Storage battery production is a case study in how one plant may snowball into an industrial group. It is one Atlantans hope will be duplicated in other lines. Sears Roebuck opened shop in Atlanta in 1926 and set up Globe Battery Co. Georgia Lead Works installed a smelter to supply it. In the early thirties National Battery Co. established a plant there. In 1941 Auto-Lite Battery Corp. put up a plant and Atlantic Separator Co. began an operation to supply separators. Next came Price Battery Co., Electric Storage Battery Co., and the Richardson Co. Auto-Lite is now ready to double its plant capacity.

Southeastern States

Pittsburgh

• • • For purposes of this study the following are considered Southeastern states: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia.

In considering steel capacity of the area the mills at Ashland and Newport, in northern Kentucky, are not included because of their location on the Ohio border. They do, of course, sell their products in Southeastern states, as do mills in Pennsylvania, West Virginia and Maryland.

Atlantic Steel Co., Atlanta, producers of bars, bands, angles, channels and strip, is now actively soliciting forging, stamping, job galvanizing and heat treating business. With some increase in forging and stamping facilities it could become an important automotive parts supplier for the district's three assembly plants.

The economy of the South, by national standards, is unbalanced. The South has 52 pct of the nation's farms but only 19 pct of its factories. New industry and expansion of older plants coupled with mechanization of agriculture are changing these ratios.

Higher farm wages are forcing mechanization and it is estimated that within the next few years more than a million farm laborers will have to find jobs in commerce and industry. Both Allis Chalmers and J. I. Case have recently built Alabama plants, the former at Gadsden, the latter at Anniston, to make tractors and farm equipment. Goodrich has built a plant at Tuscaloosa, 60 miles from Birmingham, and Goodyear has expanded its Gadsden factory.

The rated ingot capacity of the Southeast has been increased from 2,762,000 net tons in 1938 to 3,837,400 net tons as of Jan. 1, 1949. This is a 39 pct boost. During this same period, ingot capacity of the United States grew by 17.5 pct.

Much of this expansion of capacity came about because of the war. Between Jan. 1, 1945, and Jan. 1, 1948, the increase in rated capacity was just 136,400 tons. No further Southeastern steel expansion plans have been announced but some gains in producing ability are expected from enriching burdens of Birmingham district blast furnaces with higher quality ores.

Treated local ores average less

Significant • • •

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By GEORGE F. SULLIVAN
Pittsburgh Regional Editor

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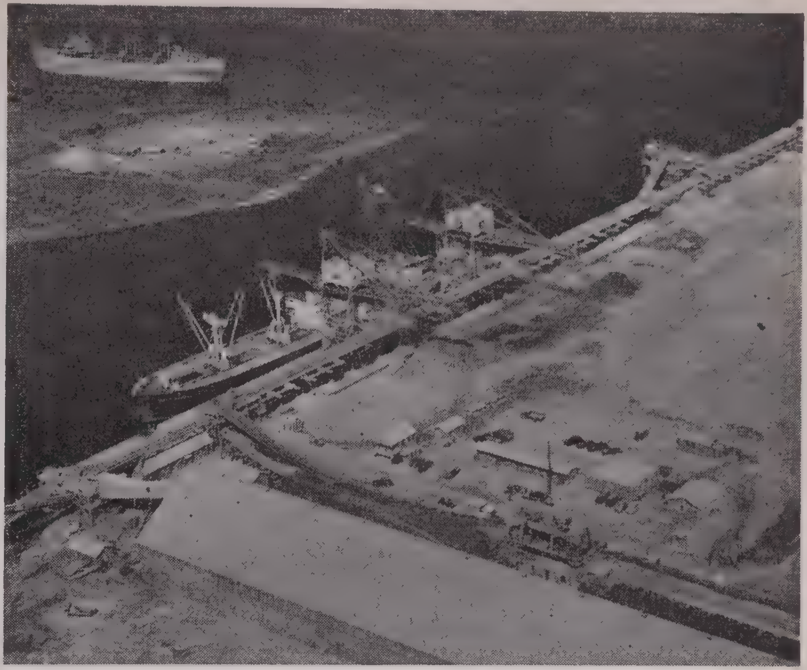
than 40 pct Fe content. A Birmingham blast furnace on 38 pct Fe ore will only produce 700 tons a day against 1000 tons from a duplicate furnace in the North on 52 pct Fe ore. Imports of Brazilian and Swedish ore have improved performance of the Tennessee Coal, Iron & R.R. Co. furnaces in the Birmingham district.

Technological changes in Birmingham district steel mills have followed those in the North but at a slower rate. TC & I has recently installed a continuous mill for cold-reduced sheets and plans to stop selling hot-rolled annealed (hand mill) sheets in the third quarter of this year. In July 1948 Republic Steel started the first electric welded pipe mill in the Southeast, now has a 4-year backlog of 24-in. and 30-in. diam pipe for natural gas lines.

The current shortage of plates and structural shapes parallels that in the North, but on analysis, it appears that ingot capacity in the district has kept at least even with the increasing living standard. Market analysts are optimistic about the future but it may take a few more years before the steel demand trend can be plotted with some semblance of accuracy.

In 1929 income payments in these 11 states were 10.5 pct of the national total. Ten years later they were 10.9 pct, but by 1947 they accounted for 13.6 pct of the national income. Total income in these states in 1947 was 184 pct above the 1940 figure, in contrast with a national average income increase of 150 pct.

Per capita income in the Southeast is low compared to the entire country. It averaged $883 in 1947; the comparable national figure was $1323. It varies sharply by states: Florida led the group with $1104, Mississippi trailed with $659.



GETTING BIGGER: *The bulk materials handling plant at the Alabama State Docks, Mobile are scheduled for enlargement through the addition of docking space and another tipple. Currently it handles more than a third of U. S. manganese ore imports. The port is connected to the Birmingham district by the Warrior River. South American ore is also unloaded here.*

If one excludes the steel plants in Kentucky because of their location in the north of the state on the Ohio border, the steel ingot capacity of the Southeast is low. Steel ingots are made in Alabama, Georgia and Tennessee. While the national average ratio of ingot capacity to population is now about 1300 lb for each of our 145 million persons, the comparable figure for the Southeast is 300 lb. Throwing in Kentucky's ingot capacity would boost this to 345 lb. Because the national capacity figure includes export steel, because Southeastern per capita income is 37 pct below the national average, and because of certain intangibles, this 300 lb—or 345 lb—figure is not intended to show any deficiency. It is offered simply as a guide to the relatively low industrial level of this part of the country. (Among the "intangibles" is the fact that many southern steel consumers buy from Pittsburgh or Wheeling district mills or from Sparrows Point.)

When a section that has had a relatively low industrial potential begins to grow, that growth often shows up in sharp contrast with more advanced areas of the country. Study of the percentage change in the proportion of total U. S. income payments in 1947 compared to 1940 as received in different regions is significant. The Northwest, Southwest, Far West and Southeast scored gains ranging from 20 pct to 14 pct, while the Middle East, New England and Central regions showed losses ranging from 15 pct to 2 pct, respectively.

To Direct Research Group

Houston

• • • **Appointment of** Dr. Emory N. Kemler of New York City, a research and production engineer in petroleum and other fields, as associate director of Southwest Research Institute in Houston was announced recently by the institute's governor-trustees and Dr. Harold Vagtborg, president.

Dr. Kemler, who succeeds Dr. John V. Pennington, on leave of absence from the institute to direct the Drilling Research, Inc., program begun last month, resigned the post of acting director of research for New York University to administer the institute's program in Houston. He has taken over the institute's Oil and Gas Bldg. offices and will be active in the development of its Houston laboratory facilities.

ASTE Annual Meeting

Pittsburgh

• • • **The American Society** of Tool Engineers, holding its 17th annual meeting in Pittsburgh on Mar. 10 to 12, 1949, has planned a combination technical meeting-plant visitation program that will be climaxed with an annual dinner and the installation of new national officers. The speaker at the dinner will be Latham E. Osborne, senior operating vice-president of Westinghouse Electric Corp., Pittsburgh.

L. E. Osborne

Five technical sessions during the 3-day meeting include discussions of five important phases of plant engineering. The first session will consist of a paper on upsetting and forging equipment, while a simultaneous session will consist of three papers, two of which are on glass and the third on industrial color. The third session will deal with corrosion resistant steels and the problems in processing, forming and machining them. The fourth session will be devoted to metal spraying, while the fifth, held simultaneously with the fourth, will deal with fabricating, drawing, spinning and machining of aluminum and aluminum alloys.

The plant visitation part of the program will include scheduled plant tours to Westinghouse Air Brake Co., National Supply Co., James H. Matthews & Co., the Westinghouse Electric Corp., Firth-Sterling Steel & Carbide Corp., the Irvin Works of Carnegie-Illinois Steel Corp., Gulf Research & Development Co.'s laboratories, and Aluminum Co. of America. Following is a detailed program of the meeting:

Irwin Holland
ASTE President

ASTE Program for Annual Meeting

SATURDAY, MARCH 12

9:30 A.M.

Meeting, Committee on Professional Engineering, Parlor D

Honor Awards and Judicial Committee Meeting, Parlor B

10:00 A.M.

Technical Session, Fort Pitt Room
Chairman, Russell C. Niemeier, president, Barney Machinery Co., Pittsburgh

"Basic Facts Concerning Metal Spraying," Walter B. Meyer, secretary, American Metallizing Contractors Association; manager, Metallizing Div., John Nooter Boiler Works Co., St. Louis

Technical Session, Monongahela Room

"Fabricating Aluminum," Chairman, Gardner Young, tool supervisor, Westinghouse Electric Corp., East Pittsburgh

"Drawing and Spinning Aluminum and Its Alloys," E. G. Kort, jobing div., Aluminum Co. of America, New Kensington, Pa.

"Efficient Machining of Aluminum Alloys," E. S. Howarth, chief, metal workers div., Aluminum Research Laboratories, Aluminum Co. of America, New Kensington, Pa.

2:00 P.M.

Tour and Sky Show, Buhl Planetarium and Institute of Popular Science

7:00 P.M.

Annual Dinner and National Membership Meeting, Ballroom
Installation of national officers
Installation of Pittsburgh chapter officers

Address by Latham E. Osborne, senior operating vice-president, Westinghouse Electric Corp., East Pittsburgh

Entertainment

FRIDAY, MARCH 11

9:30 A.M.

House of Delegates Meeting, Monongahela Room

Board of Directors Meeting, Fort Duquesne Room

9:30 A.M.-12:45 P.M.

Plant Tours—9:30, Combined tour, Carbide Div., Firth-Sterling Steel & Carbide Corp., and Irvin Works, Carnegie-Illinois Steel Corp.; 9:45, Gulf Research & Development Co. Laboratories; 11:00, East Pittsburgh Works, Westinghouse Electric Corp.; 11:45, New Kensington Plant, Aluminum Company of America; 12:00, Industrial Div., Westinghouse Air Brake Co.

1:30 P.M.

Ladies' Tour—H. J. Heinz Co.

8:00 P.M.

Technical Session, Urban Roof

"Processing Corrosion-Resistant Steel" Chairman, Forest F. Versaw, shop superintendent, Gulf Research & Development Co. Laboratories, Harmarville, Pa.

"Problems in Forming Corrosion-Resistant Steel," George A. Roberts, chief metallurgist, Vanadium-Alloys Steel Co., Latrobe, Pa.

"Techniques for Machining Corrosion-Resistant Steel," Malcolm F. Judkins, chief engineer, Carbide Div., Firth-Sterling Steel & Carbide Corp., McKeesport, Pa.

THURSDAY, MARCH 10

8:30 A.M.

Registration Opens, 17th Floor
(Advance registration for early arrivals, from 2:00 P.M., Wednesday)

9:30 A.M.

House of Delegates Caucus, Fort Duquesne Room

National Education Committee Meeting, Parlor E

National Editorial Committee Meeting, Parlor C

12:00-12:45 P.M.

Plant Tours—12:00 Noon, Industrial Div., Westinghouse Air Brake Co.; 12:15, National Supply Co.; 12:30, Bronze Div., James H. Matthews & Co.; 12:45, Gearing Div., Nuttall Works, Westinghouse Electric Corp.

8:00 P.M.

Technical Session, Fort Pitt Room
Chairman, William W. Walter, sales engineer, Barney Machinery Co., Pittsburgh

"Design of Dies for Upsetting and Forging Machines," William W. Criley, vice-president and general manager, Ajax Mfg. Co., Cleveland

Technical Session, Monongahela Room

"Industrial Applications of Glass"
Chairman, Arthur G. Crowell, tool engineer, Kerotest Mfg. Co.; J. Wesley Richards, industrial designer, Koppers Co., Pittsburgh

"Modern Glass Development," Robert A. Miller, technical sales engineer, Product Development Dept., Glass Div., Pittsburgh Plate Glass Co., Pittsburgh

"Color as a Tool," Nelson A. Mason, manager, Maintenance-Painter Sales, Paint Div., Pittsburgh Plate Glass Co., Pittsburgh

Foundrymen Organize To Fight Air Pollution

Chicago

• • • **Air pollution** received another setback last week when an organization of foundrymen joined the cleaner air committee of the Chicago Assn. of Commerce and Industry. This is the latest group to be formed among Chicago industrial executives for the reduction of air pollution in this city.

This group will function as a subcommittee and the chairman of the foundrymen's subcommittee is James R. Allen of International Harvester Co. The nonferrous foundry subgroup is also being formed. The purpose of this committee will be to curb the part of air pollution contributed by the foundries in Chicago.

From data already compiled, 55.91 tons of dust were deposited, on the average, over each square mile of the city of Chicago each month last year. The average in 1947 was 61.25 tons. The combustible material in the dust collected amounted to 10.72 tons per square mile per month as against 11.90 the preceding year. The Chicago Assn. of Commerce and Industry's chart of the factors related to Chicago's air pollution, depicts the annual average and rise and fall of six major factors over periods ranging from 2 to 10 years. The peak of the haze, smoke and dust factor, is reached in April.

GM Plans New Division

Cleveland

• • • **Plans for a** $2 million addition to the Cleveland Diesel Engine Div., General Motors Corp., were announced here by George W. Codrington, general manager of the division and a GM vice-president.

Construction Steel . . .

New York

• • • **The estimated total bookings** of fabricated structural steel for January were off to 125,834 tons, according to reports received by the American Institute of Steel Construction. This compares with 169,553 tons booked in December and 160,634 tons booked in January, 1948.

Shipments also showed a decline to 147,659 tons as compared with 182,370 tons in the previous month, but were slightly higher than the 146,363 tons shipped in January, 1948.

The backlog (tonnage available for future fabrication) for the next 4 months only stands at 675,464 tons.

• • • **Fabricated steel awards** this week included the following:

2200 **Tons,** Sacramento, Calif., California State Div. Architecture, State Capitol addition, Sacramento, to Bethlehem Pacific Coast Steel Corp.

700 **Tons,** Beloit, Wis., High School Building to Milwaukee Bridge Co., Milwaukee.

425 **Tons,** Hempstead, L. I., Building, F. W. Woolworth & Co., to Grand Iron Works, New York.

330 **Tons,** San Bernardino, Calif., engineering building on San, Bernardino campus through R. J. Daum Construction Co. to Pacific Iron & Steel Co., Los Angeles.

140 **Tons,** Flemington, N. J., school to Bethlehem Fabricators, Inc., Bethlehem.

125 **Tons,** North Adams, Mass., boiler house for Sprague Electric Co. to Providence Steel & Iron Co., Providence.

• • • **Fabricated steel inquiries** this week included the following:

500 **Tons,** Hinsdale, Ill., high school building, Gage Structural Steel Co., Chicago, low bidder.

300 **Tons,** Evanston, Ill., addition to high school gymnasium.

275 **Tons,** Anheim, Calif., bridge across San Gabriel River, 8½ mi. west of Anaheim, California Div. of Highways, Los Angeles.

250 **Tons,** Charlestown, Mass., grain elevator, Hoosac Pier.

250 **Tons,** Lexington, Mass., new high school.

175 **Tons,** Chicago, Eden Parkway, Arcol-Midwest Corp., Chicago, low bidder.

150 **Tons,** Chicago, miscellaneous construction at Douglas Airport, bids to close Mar. 7.

• • • **Reinforcing bar awards** this week included the following:

190 **Tons,** San Bernardino, Calif., engineering building on San Bernardino campus, through R. J. Daum Construction Co. to Jos. T. Ryerson & Son, Inc., Chicago.

• • • **Reinforcing bar inquiries** this week included the following:

2275 **Tons,** Helena, Mont., Canyon Ferry dam and power plant, Bureau of Reclamation, Helena, Spec. 2585, bids to Apr. 6.

685 **Tons,** Chicago, Wacker Drive Extension through the Board of Public Improvements, Herlihy-Midcontinent Co., of Chicago, low bidder.

510 **Tons,** Chicago, store addition for Montgomery Ward previously reported, project has been indenitely postponed.

300 **Tons,** Hinsdale, Ill., high school building, E. H. Marhoefer Co., Chicago, low bidder.

110 **Tons,** Klamath Falls, Ore., Lost River diversion channel enlargement, Bureau of Reclamation, Klamath Falls, bids to Mar. 25.

• • • **Sheet steel piling awards** this week included the following:

1100 **Tons,** Philadelphia, coal storage piers at Port Richmond, Philadelphia Electric Co., to Bethlehem Steel Co., Bethlehem.

• • • **Sheet steel piling inquiries** this week included the following:

800 **Tons,** Elizabethport, N. J., bulkheads and accessories for pier, Singer Sewing Machine Co.

110 **Tons,** Centerton, N. J., pier repairs for Burlington County bridge.

110 **Tons,** Philadelphia, pier for Koppers Coke Co.

• • • **Railroad car awards and inquiries** this week included the following:

Chicago & Northwestern R.R has ordered 1000 box cars and 250 auto box cars from Pullman-Standard Car Mfg. Co., Michigan City, Ind. The Clinchfield R.R. has ordered 35 70-ton covered hoppers from the American Car & Foundry Co. The Santa Fe has cancelled 250 refrigerator cars to be built in their own shops due to the citrus fruit failure. It is reported in Chicago that the C. & O. R.R. has cancelled an order for 500 freight cars.

---

50 YEARS AGO

THE IRON AGE, *March 2, 1899*

• The gay nineties has their production records too—"Production of Bessemer steel ingots in 1898 was 6,609,017 gross tons, against 5,475,315 tons in 1897 . . . an increase of 1,133,702 tons, or over 20 pct. The Production of 1898 was much the largest in our history."

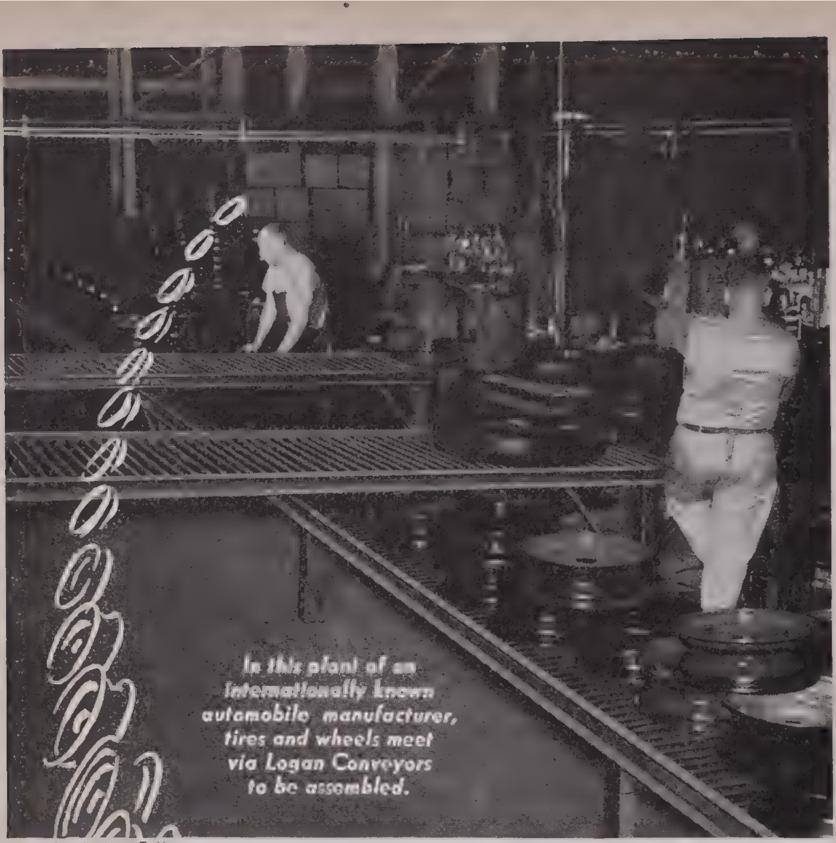
• **"On account of the very large force of employees at the Homestead Steel Works, it has been found necessary to have three pay days in the future. Day men will be paid on alternate Wednesdays, the clerical force on intervening Fridays and the tonnage men on alternate Saturdays."**

• "Pickands, Mather & Co. of Cleveland, Ohio, who recently purchased Ella Furnace at West Middlesex, Pa., have given a contract to Taylor Bros. at Sharon, Pa. for the erection of a 1200-ft. bin for the storing of ore, coke and limestone."

• **"The need of another valley steel plant is recognized, and with the ore and coke properties owned by some of the furnaces it is believed a plant could be erected that could compete with the strong National Steel Co. and be a profitable investment."**

• "We have been officially advised by Edward A. Schoen of the Pressed Steel Car Co. of Pittsburgh that the new steel car works erected by the company will be located at McKee's Rock, Pa. . . . Already orders have been placed for $700,000 worth of large machine tools and the buildings will cost $250,000."

• **"A portion of the Buffalo, Rochester and Pittsburgh railroad, near Punxsutawney, Pa. will have to be rebuilt . . . Contractors took a quantity of cinders and coke dust from the adjoining coke yards for the foundation of a large filling . . . It was soon apparent that the coke beneath was on fire."**



In this plant of an internationally known automobile manufacturer, tires and wheels meet via Logan Conveyors to be assembled.

HELPING WHEELS to get around

Logan Conveyors act as "match-maker" by delivering tires and wheels to assembly stations where operators combine them into one unit . . . send them swiftly on their way.

A typical example showing how Logan Conveyors provide manual-free movement of materials at the required productive pace and at convenient working heights for workers. It is quite likely that an extension of your use of conveyors will provide increased individual output—without requiring a longer work day or greater effort on the part of operators.

Literature dealing with the application of Logan Conveyors to a wide variety of industrial handling problems is available on request. There's no obligation — write for it today.

CONVEYORS ARE PART OF THE PROCESS

Logan Conveyors

LOGAN CO., INC., 545 CABEL ST., LOUISVILLE 6, KY.

Urges Better Forecasting As Business Safeguard

New York

• • • **Joint action** by the nation's industrial buyers and sellers to take some of the guesswork out of production forecasts is urged by Richard H. DeMott, vice-president in charge of sales of SKF Industries, Inc., as a means of safeguarding the national economy.

"Producing the right things at the right times and in the right quantities," he told a joint meeting of Philadelphia Sales Managers Assn. and Purchasing Agents Assn. here recently, "is a positive and urgent approach toward stabilizing and maintaining the national economy."

This could be achieved, he said, by a greater willingness on the part of buyers to make known production requirements as soon as possible and by determined efforts of salesmen to be of "real service"—not just glorified order-takers." In this way, Mr. DeMott pointed out, management can effectively schedule factory *facilities* for goods that are immediately needed by consumers. He said "there already has been too much harmful guesswork in this direction."

While it is impossible to fully control the public's buying habits or movements in business activity, he said, unbalanced production can be minimized by more accurate forecasting. "We are all too familiar with cutbacks or cancellations when demand in some one industry fails," the SKF official explained. "But too often we fail to meet promptly another rising market because supplies are not immediately available."

The accumulation of slow-moving stocks as a result of poor forecasting not only constitutes a serious financial drain upon business enterprise, Mr. DeMott said, but acts as a destroyer of morale among factory organizations and impairs buyer-seller relationships "because valuable time was taken to build something we thought the buyer needed, but which was not what he really wanted."

He pointed out that the armed services, as a buyer of huge quantities of material during the war, kept industry constantly advised "to the best of their ability" of what items were urgently needed,

TINNERMAN
Speed Nut
Savings Stories

"SPEED NUTS* PROVIDE AVERAGE SAVINGS OF $3.00 PER UNIT"

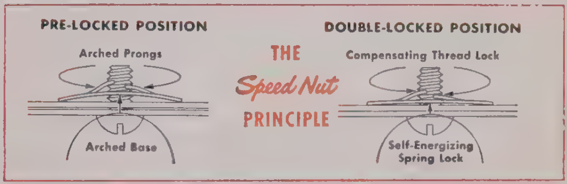
**Reports HEYER PRODUCTS CO., INC.
Belleville, New Jersey**

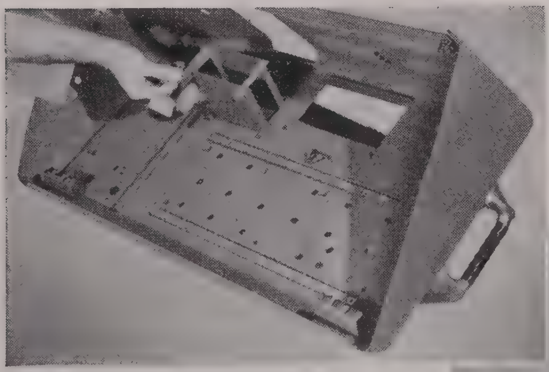
"SPEED NUTS take less time, effort and skill to apply. They eliminate assembly steps such as welding and riveting. And they greatly reduce our handling and inventory problems".

These are the reasons why Tinnerman SPEED NUTS save Heyer Products $3.00 per unit on their new automotive distributor stroboscope. A recent study of time and cost records revealed this remarkable SPEED NUT Savings Factor.

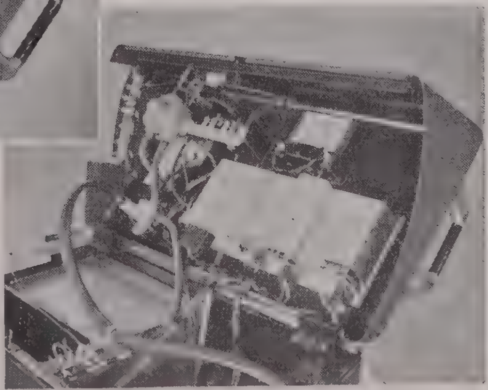
Many manufacturers, like this important producer of automotive test equipment and battery fast chargers, rely on the SPEED NUT brand of fasteners to reduce assembly costs.

If you're interested in holding down spiraling costs, find out now about our Fastening Analysis Service. Just call the nearest Tinnerman office, or write us for details. Tinnerman Products, Inc., 2040 Fulton Road, Cleveland 13, Ohio. Sales offices in principal cities. *In Canada:* Dominion Fasteners Limited, Hamilton. *In England:* Simmonds Aerocessories, Ltd., Treforest. *In France:* Aerocessoires Simmonds, S. A., Paris.


PRE-LOCKED POSITION
Arched Prongs
Arched Base
THE
Speed Nut
PRINCIPLE
DOUBLE-LOCKED POSITION
Compensating Thread Lock
Self-Energizing Spring Lock



1. At left—SPEED NUTS are being positioned by hand on the inside of control panel on the distributor stroboscope. These self-retaining SPEED NUTS hold themselves in position for blind assembly attachment of controls and instruments.

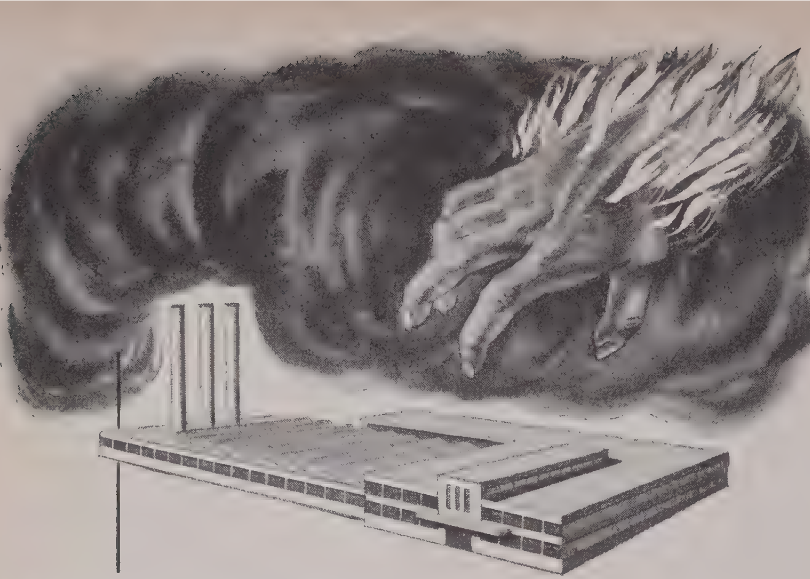


2. The finished control panel, right, shows the number of precision instruments held by secure, vibration-proof SPEED NUTS.

TINNERMAN Speed Nuts

*Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS



The Time to Worry About

FIRE

Is BEFORE It Strikes!

• It's frequently said that, *when fire strikes*, the first 60 seconds are the most important. But, ability to capitalize those vital seconds is equally important. And such ability comes only from *advance* planning . . . and action!

Make the check now that reveals the danger spots in your operation. Match the cost of quick, adequate protection against the loss from a disastrous fire . . . or even a small fire in a key location. The time to worry about fire is *before* it strikes!

CARDOX—pioneers of low pressure carbon dioxide as an effective fire fighting medium—will welcome the opportunity to cooperate in this vital check-up. **"CARDOX" Low Pressure Carbon Dioxide Fire Extinguishing System*** provide many fire-fighting advantages.

Such skillfully engineered systems, in pounds or tons, provide amazingly quick, positive extinguishment.

**Covered by issued and pending patents.*
Write for Bulletin 239.

CARDOX *offers all* THREE

• EXTINGUISHMENT
Cardox engineered applications give carbon dioxide enhanced effectiveness for faster, surer extinguishment of large or small fires, indoors or out

• PREVENTION
Cardox Atmosphere Inerting Systems provide low-cost inert gas for continuous fire and explosion protection

• DETECTION
Cardox Detection Systems, actuated by heat, smoke or flame, operate as a warning device or to actuate fire extinguishing systems.

CARDOX
CO₂ FIRE EXTINGUISHING SYSTEMS

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Los Angeles • San Diego • San Francisco

Steel Lags Other Goods In Advance of Prices

New York

• • • **Prices of iron** and steel have risen only two-thirds as much as the average of all commodities since 1939, according to the American Iron and Steel Institute. This comparison, based on wholesale price indexes published by the United States Bureau of Labor Statistics, indicates that steel has resisted inflation more than most other major material markets of the country.

Increases in steel prices lagged far behind increases in commodities as a whole. Not until 1947 did the rise in iron and steel reach a level that had been attained by the average of all commodities in 1945. Iron and steel prices in 1947 averaged less than 40 pct higher than in 1939, while commodities in general had advanced almost 100 pct.

Toward the end of 1948, iron and steel prices, up 72 pct since 1939, were far behind the average commodity level, which was up 114 pct. At that time, in fact, steel was still below the 1947 level for other commodities, the institute reported.

Steel Map Has Changed, Developed and Expanded During the Past Decade

New York

• • • **The map of** the steel industry, like a map of world events, has changed, developed and expanded in recent years, according to the American Iron and Steel Institute.

The industry's mills and furnaces are now spread over 30 states against 27 states in 1938. More than 400 plants, making or finishing iron or steel in 250 communities, are scattered through those 30 states, which have 85 pct of the nation's population.

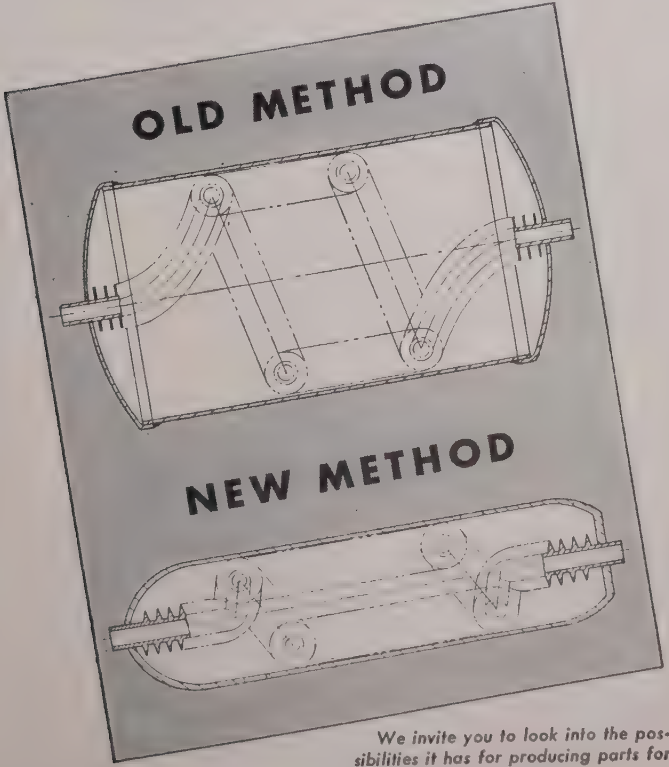
This takes no account of the location of raw material operations or other facilities not directly engaged in steel production. In 1938 the total number of steel plants in the country was only 360.

Ten years ago, Florida, Iowa and Utah were not on the steel map. The first two have now acquired

HOW A *Change in Design* REDUCED COSTS

But in addition to effecting substantial reductions in the fabrication costs the new design also brought about material gains in performance efficiencies of the part.

It all resulted from the combining of Wolverine's revolutionary spinning process with Wolverine Trufin—the integral finned tube. In the "old method" the finned tube was of the type that could not be bent on small centers thus producing a shell of larger diameter than necessary. Wolverine Trufin, however, could be coiled on small diameters (without using supporting tools) and effect a reduction in shell size. This accomplished, the new and smaller shell size was easily produced by our spinning process and brought about a reduction in the cost of the shell. Because of the accumulation of the copper shell and copper finned tube in a small space, the total requirement of finned tube surface was less, which further reduced the cost of the entire assembly. The accompanying illustrations tell you most of the story.



OLD METHOD

Material:

1. Steel tube shell
2. Finned tube
3. End cap blanks

Operations:

1. Punch holes in shell
2. Punch holes in caps
3. Coil finned tube on 4½″ centers
4. Center, cut off and strip tails of coil
5. Assemble coil into shell
6. Assemble end caps
7. Weld caps

NEW METHOD

Material:

1. Seamless copper tube
2. Finned tube

Operations:

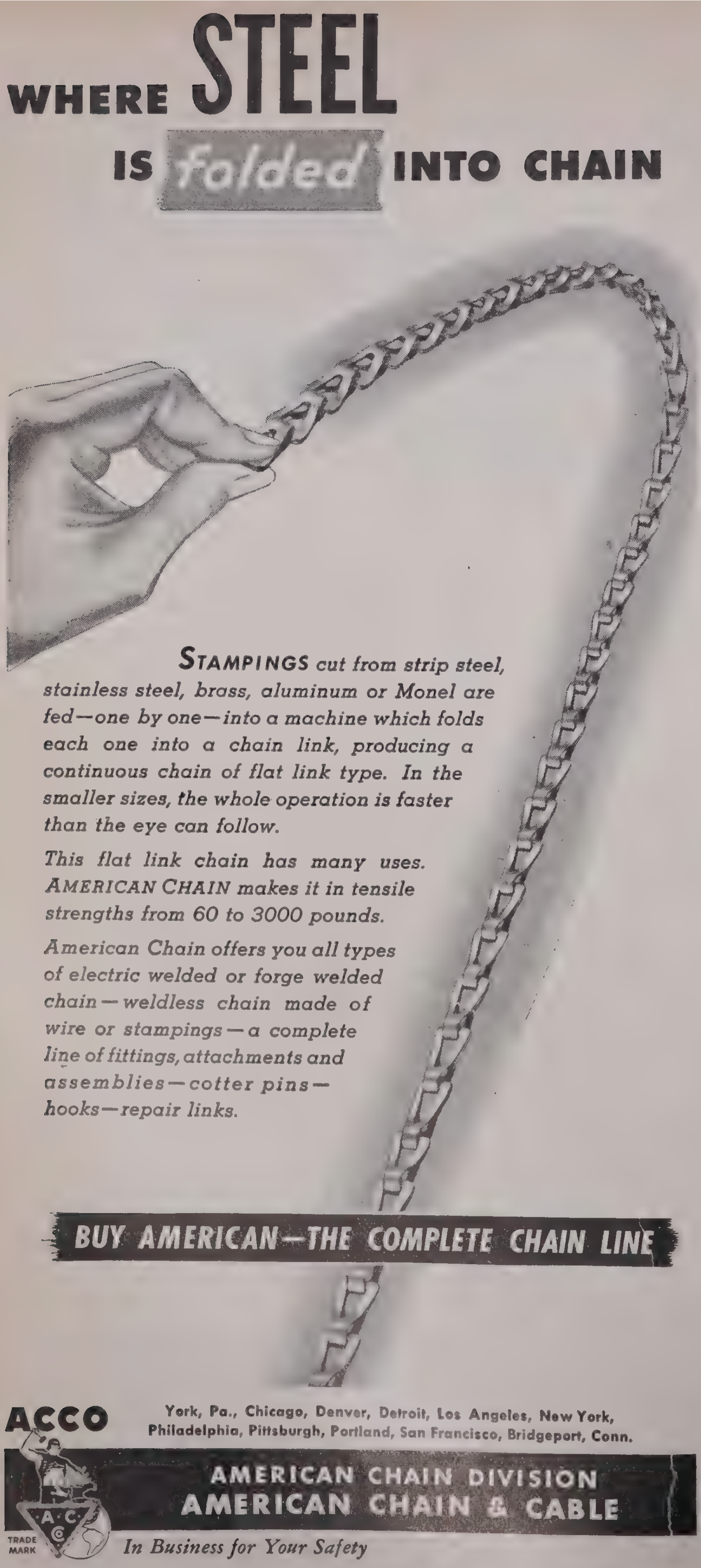
1. Punch holes in shell
2. Coil finned tube on 2″ centers
3. Center, cut off and strip tails of coil
4. Assemble coil into shell
5. Spin both ends

RESULTS

1. *Less parts*
2. *Less operations*
3. *No shell joints—less possibility of leakage*
4. *Better gas distribution, more efficient use of available condensing surface*
5. *Durability of copper shell*

We invite you to look into the possibilities it has for producing parts for you. Send for booklet.

WOLVERINE TUBE DIVISION
CALUMET AND HECLA CONSOLIDATED COPPER COMPANY
INCORPORATED
MANUFACTURERS OF SEAMLESS NON-FERROUS TUBING
1441 CENTRAL AVENUE • DETROIT 9, MICHIGAN



WHERE STEEL IS *folded* INTO CHAIN

STAMPINGS *cut from strip steel, stainless steel, brass, aluminum or Monel are fed—one by one—into a machine which folds each one into a chain link, producing a continuous chain of flat link type. In the smaller sizes, the whole operation is faster than the eye can follow.*

This flat link chain has many uses. AMERICAN CHAIN makes it in tensile strengths from 60 to 3000 pounds.

American Chain offers you all types of electric welded or forge welded chain—weldless chain made of wire or stampings—a complete line of fittings, attachments and assemblies—cotter pins—hooks—repair links.

BUY AMERICAN—THE COMPLETE CHAIN LINE

ACCO

York, Pa., Chicago, Denver, Detroit, Los Angeles, New York,
Philadelphia, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

AMERICAN CHAIN DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

finishing capacity without becoming steel ingot makers.

California has become one of the first ten producing states. It is first in reinforcing bar capacity and makes seven products which it did not make in 1938; Texas is now the producer of a diversity of products. Indiana has become the state with the largest tin and terne plate capacity; Wisconsin is now second largest in electric weld pipe and tube capacity; Illinois has assumed the leadership in plain and galvanized wire capacity. Utah is in fourth place in plate capacity, exceeded by Pennsylania, Indiana and Illinois. The new mills in Florida and Iowa are wire mills.

In the ten years, raw steel capacity of the country increased 17.5 pct. Oregon, Tennessee and Utah are the newly listed producers of raw steel. Texas' capacity rose from 4325 tons per year to 582,320 tons. Increases in other states are:

Pct Increases in Steel Capacity

(1948 vs. 1938)

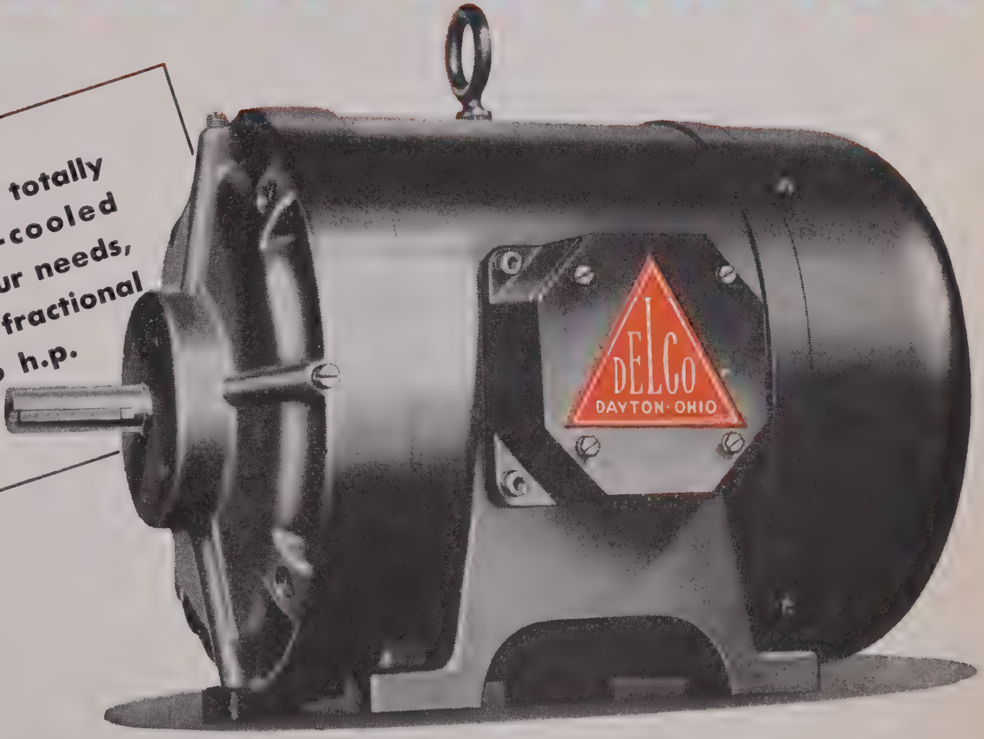
Alabama	46.2
California	147.7
Colorado	27.8
Connecticut	40.3
Delaware	8.7
Georgia	7.8
Illinois	25.6
Indiana	15.0
Kentucky	13.0
Maryland	41.3
Massachusetts	17.4
Michigan	11.7
Minnesota	105.3
New Jersey	4.5
New York	11.6
Ohio	6.3
Pennsylvania	7.6
Rhode Island	5.3
Virginia	130.8
Washington	99.3
West Virginia	11.5

The rank of leading states in capacity for raw steel, blast furnace and hot rolled output is as follows:

	Raw Steel Capacity	Blast Furnace Capacity	Hot Rolled Capacity
Pennsylvania	1	1	1
Ohio	2	2	2
Indiana	3	3	3
Illinois	4	4	4
Maryland	5	7	5
New York	6	5	6
Alabama	7	6	7
Michigan	8	8	8
West Virginia	9	9	9
California	10	..	10
Utah	11	10	12
Colorado	12	11	11
Kentucky	..	12	..

DELCO MOTORS

STAND UP TO THE JOB



There is a Delco totally enclosed fan-cooled motor to fit your needs, in sizes from fractional ratings to 75 h.p.

Here at the factory, Delco motors are rated in terms of horsepower. In the field of industry, we are proud to say, they are rated *tops.* Large or small, every Delco motor is built to carry its rated load and to keep on carrying it even under the most adverse conditions. When you count on Delco motors for power, you don't have to count on down-time. Delco's ability to deliver continuous, trouble-free power is due to special construction and design features—such as positioned bearings, Delcote coil insulation, corrosive-resistant cast iron frame, positive lubrication, dynamically balanced rotor and shaft assembly, water-tight conduit box.

For complete data on Delco Motors, address Delco Products, Dayton, Ohio, or our nearest sales office.

DELCO PRODUCTS DAYTON, OHIO

DELCO MOTORS

DELCO PRODUCTS, DIVISION OF GENERAL MOTORS CORPORATION

SALES OFFICES: CHICAGO • CINCINNATI • CLEVELAND • DETROIT • HARTFORD, CONN.

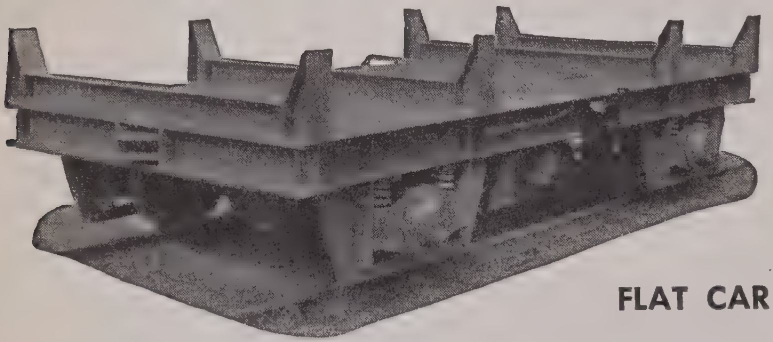
ATLAS

INTRA-PLANT HAULAGE

EQUIPMENT

SPEEDS PRODUCTION
LOWERS COSTS

40 TON

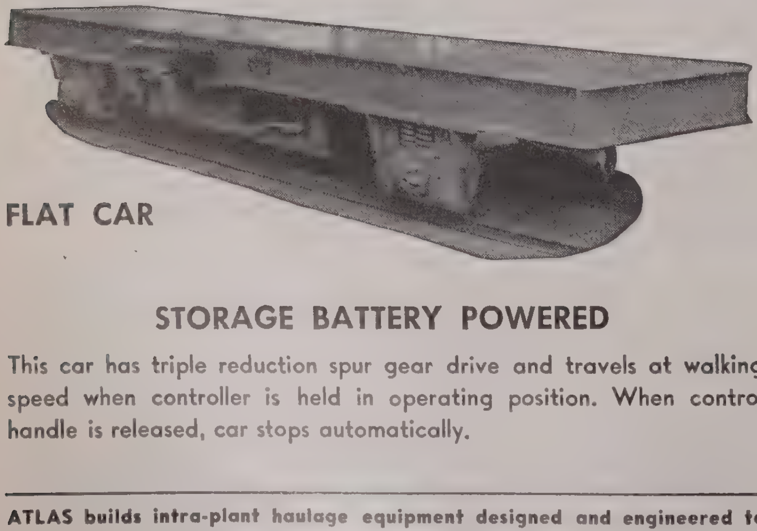


FLAT CAR

STORAGE BATTERY POWERED

Car equipped with triple reduction drive to one axle. Magnetic brake on motor armature shaft and controller arranged to return to "off" position automatically. Car also arranged to haul a similar trailer on level track.

20 TON



FLAT CAR

STORAGE BATTERY POWERED

This car has triple reduction spur gear drive and travels at walking speed when controller is held in operating position. When control handle is released, car stops automatically.

ATLAS builds intra-plant haulage equipment designed and engineered to your needs.

ATLAS ENGINEERING SERVICE
ALWAYS AT YOUR SERVICE

THE ATLAS CAR & MFG. CO.
ENGINEERS MANUFACTURERS
1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

WAA Asking Bids on Two Plants in Detroit Area

Chicago

• • • War Assets Administration here is offering for sale a general manufacturing plant and a forging plant both located in Detroit. These properties are now under lease to Timken-Detroit Axle and the acquisition cost of the two plants originally totaled nearly $8½ million.

The plants are split as far as bid forms go, with bid form PIN-107 covering the general manufacturing plant. Offers must be filed with WAA before 2 p.m. Thursday, Mar. 10, and bid form PIN-106 for the forging plant must be submitted before 2 p.m. Thursday, Mar. 17. Both forms should be addressed to P.O. Box 1085, Chicago 29.

The general manufacturing plant with its personal property, which cost the government $3,620,509, is located on approximately 9.47 acres of land between West Jefferson Ave. and the joint right-of-way of the Pere Marquette, Wabash, and Detroit Terminal Railways. Eight buildings, with a total floor space of about 293,000 sq ft, will be included in the offering. The buildings are an assembly building, manufacturing building, pickling building, power house, clock house, shop, and two gate houses. The buildings contain some 500 items of machine tools and furnaces, as well as laboratory and testing equipment, and items of furniture and fixtures, all of which will be offered with the property.

The forging plant, located south of Schaefer highway, 6 miles west of downtown Detroit, is an 11.248 acre tract of land on which is situated the 11 factory buildings and 22 miscellaneous small buildings of the forging plant. Otto G. Klein, Chicago regional director, said the 11 buildings have a floor space of 143,786 sq ft and this facility contains machine tools and equipment, furnaces of various types, laboratory and testing equipment and furniture and fixtures. These buildings are serviced by spurs of the Pennsylvania and the Ohio & Detroit railways. Both pieces of property are subject to the National Security Clause.

A pleasant note for tubular needs

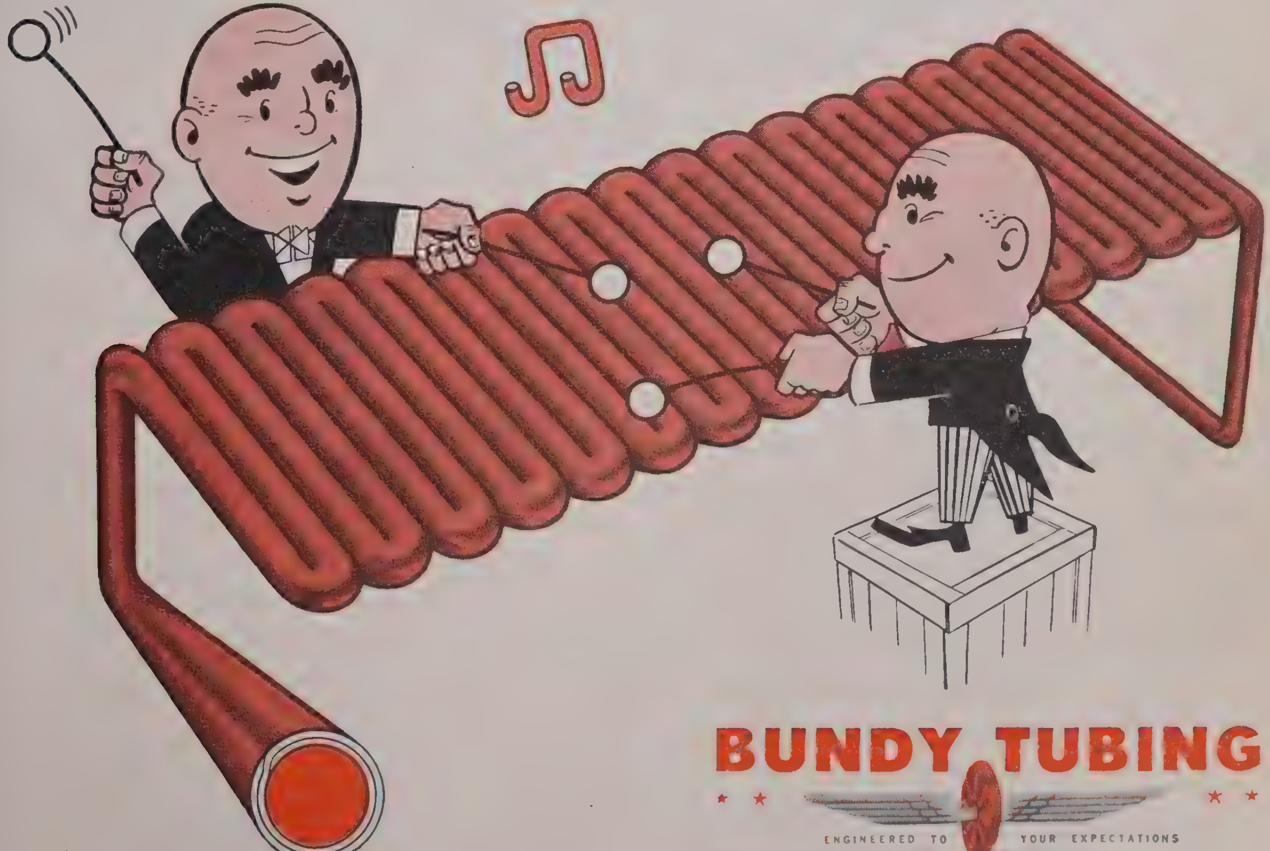
Like to add a pleasant note to your present tubular applications—a note of better design, faster production, lower costs or higher quality?

If you would, better sound out Bundyweld* Tubing!

Made of steel, Monel, or nickel by a patented process, leakproof, vibration-resistant Bundyweld is manufactured to close tolerances always. Strong yet ductile, it bends without collapsing or weakening structurally, and can be machined or fabricated easily and readily.

Tubular parts for toys, refrigeration, radiant heating, television, automobiles, machine tools, ranges . . . these are only a few of the fields that find Bundyweld ideal for their tubular needs.

If you have a tubular design or production problem, chances are that this miracle tubing of industry can strike a responsive chord in its solution. Why not give it a try? Contact your nearest Bundy representative listed below, or write direct to: *Bundy Tubing Company, Detroit 14, Michigan.*



BUNDY TUBING

ENGINEERED TO YOUR EXPECTATIONS

* REG. U. S. PAT. OFF.

WHY BUNDYWELD IS BETTER TUBING

1 Bundyweld Tubing, made by a patented process, is entirely different from any other tubing. It starts as a single strip of basic metal, coated with a bonding metal.

2 This strip is continuously rolled twice laterally into tubular form. Walls of uniform thickness and concentricity are assured by close-tolerance, cold-rolled strip.

3 Next, a heating process fuses bonding metal to basic metal. Cooled, the double walls have become a strong ductile tube, free from scale, held to close dimensions.

4 Bundyweld comes in standard sizes, up to ⅝" O.D., in steel (copper or tin coated), Monel or nickel. For tubing of other sizes or metals, call or write Bundy.

BUNDY TUBING DISTRIBUTORS AND REPRESENTATIVES

Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • *Chattanooga 2, Tenn.:* Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. *Chicago 32, Ill.:* Lapham-Hickey Co., 3333 W. 47th Place • *Elizabeth, New Jersey:* A. B. Murray Co., Inc., Post Office Box 476 • *Philadelphia 3, Penn.:* Rutan & Co., 404 Architects Bldg. • *San Francisco 10, Calif.:* Pacific Metals Co., Ltd., 3100 19th St. • *Seattle 4, Wash.:* Eagle Metals Co., 3628 E. Marginal Way • *Toronto 5, Ontario, Canada:* Alloy Metal Sales, Ltd., 881 Bay St.

BUNDYWELD NICKEL AND MONEL TUBING IS SOLD BY INTERNATIONAL NICKEL COMPANY DISTRIBUTORS IN PRINCIPAL CITIES.

20% STAINLESS
80% CARBON STEEL
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ENGINEERING
B-W
PRODUCTION

How to make stainless steel go much farther

INGACLAD
STAINLESS-CLAD STEEL

In many industrial applications, stainless steel protection is needed *only* on one side—the exposed or contact side. So *solid* stainless is not required.

That's where IngAclad Stainless-*Clad* Steel comes into its own. IngAclad is a 20% cladding of solid stainless bonded to an 80% backing of carbon steel. Thus IngAclad provides 100% stainless protection against rust, corrosion, abrasion and erosion *on the contact side.*

The advantages are obvious. *Lower material cost. Fabricates easily.*

Would you like to see how IngAclad can fit into *your* production picture? Consult our engineers—without obligation. INGERSOLL Steel Division, Borg-Warner Corporation, 310 South Michigan Ave., Chicago 4, Illinois.

Urges Canada Continue Price Control on Iron And Steel Products

Ottawa

• • • "Canada's production of steel has been and continues to be greatly short of Canada's requirements." That is Trade Minister C. D. Howe's answer to queries by Finance Minister Douglas Abbott regarding continuation of price ceilings and control on iron and steel in Canada.

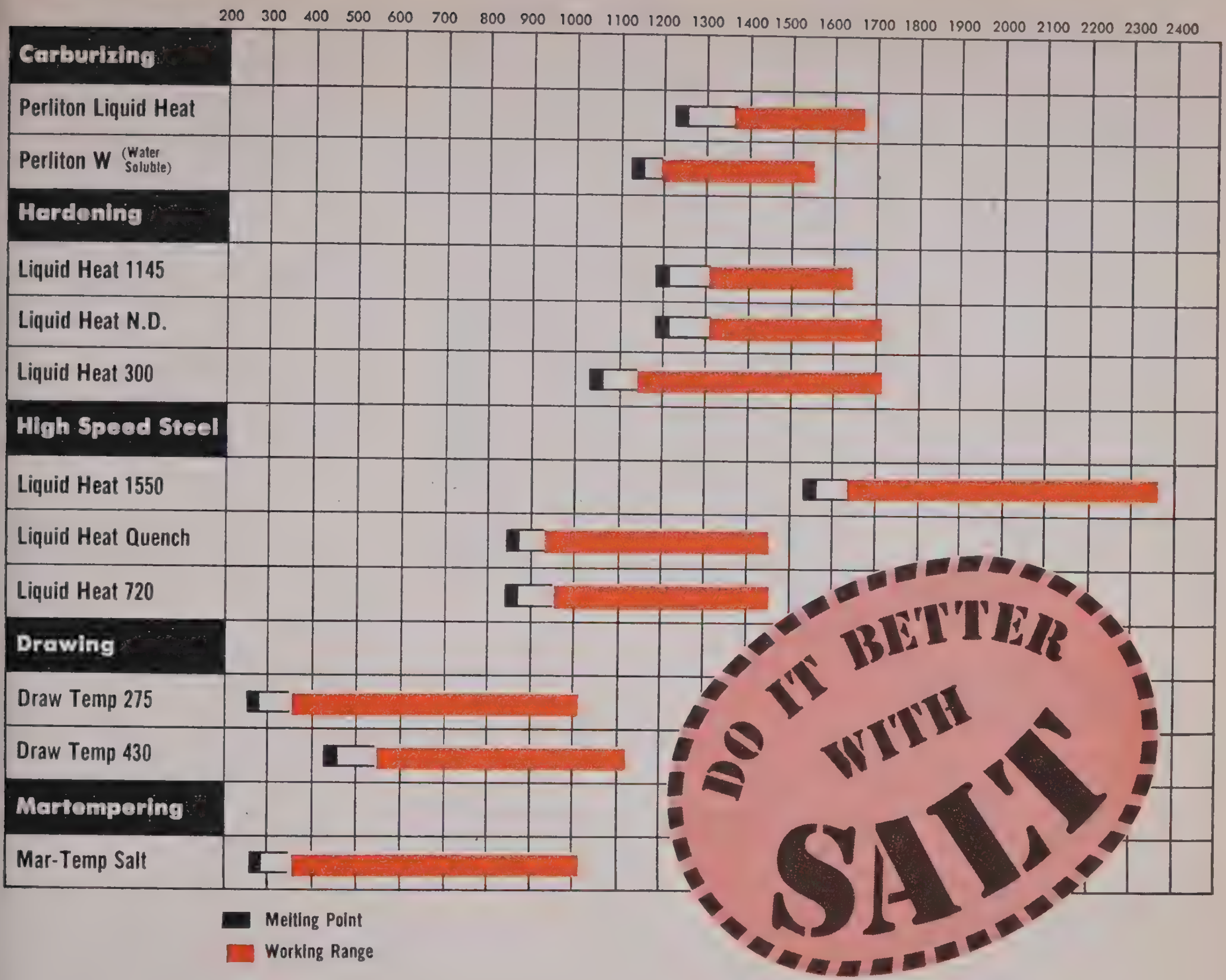
Mr. Howe said Canada had been importing roughly 30 pct of all the steel used, and those imports have been obtained with a great deal of difficulty. "By the control of steel it is possible to utilize Canada's production of basic steel to the full capacity of our finishing works," he added.

"At the present time we are moving 18,000 tons of surplus primary steel or semi-finished steel a month from the Algoma Steel Corp. at Sault Ste. Marie to the finishing plants at Hamilton. We are also moving 10,000 tons semi-finished steel a month from Dominion Steel & Coal Co. at Sydney, N. S., to Hamilton. That 28,000 tons of steel, which cannot be finished at Algoma or at Sydney, would ordinarily go for export and be finished in other countries. That was the pre-war history of the surpluses of those two plants.

"By moving that steel to Hamilton 28,000 tons per month of additional basic steel is turned into finished products. To end steel control abruptly would reduce the production of finished steel by at least 20 pct.

"Price control is maintained, as I think it should be where an acute shortage exists. All steel is handled under rigid price control. I think the industry as a whole welcomes control, since it assures to each his fair share of Canadian production."

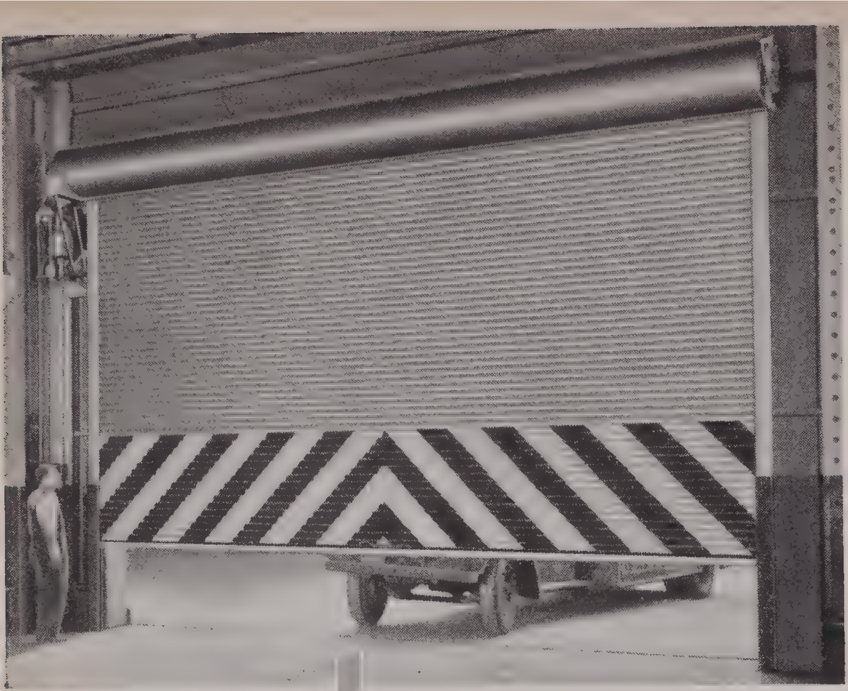
Mr. Howe said he knew of no demand that control be ended. He said he knew there was a general desire that it be continued. "I consider it definitely in the best interest of Canada that this control should continue for a further period," the minister stated.



Molten salt baths are *flexible;* they permit heating of any size of part, at any temperature, for any period. They do not require special fixtures for each job, nor enormous capital expenditures. For volume work they can be mechanized for speedy mass production. Salt baths reduce the cost of heat treating. They're non-scaling, non-oxidizing; atmosphere is controlled by being eliminated.

Add to those merits Houghton's own experience, our much-appreciated personal service, our purity and uniformity of salt mixtures—and you'll see why we insist you can "Do it Better in Salt". For catalog describing entire line, write E. F. Houghton & Co., Philadelphia 33, Pa.

HOUGHTON'S *Liquid* SALT BATHS



KINNEAR STEEL ROLLING DOORS

Space-Saving Convenience

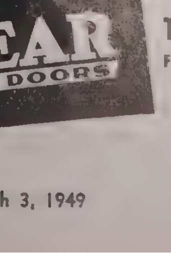
Plus a Bonus In Protection

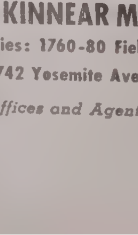
It's easy to see why Kinnear Rolling Doors offer so many cost-cutting, time-saving advantages. They open straight upward and coil into a small area above the doorway. As a result, all floor, wall and ceiling space around the opening is *fully usable at all times.* No areas need to be reserved for door action. When opened, the doors clear the entire doorway. They stay completely out of the way, safe from damage by wind or vehicles.

Along with this high efficiency and convenience, you get a bonus of all-around protection and low-maintenance service. The strong but flexible *Kinnear-originated* curtain of interlocking steel slats gives extra protection against fire, wind, riot, intrusion, and accidental damage. Kinnear Rolling Doors are built to fit any openings in old or new buildings. Motor or manual control. Write for details.

MOTOR OPERATION

The rugged Kinnear Motor Operator shown at right can be added to any Kinnear Rolling Door for maximum speed, ease, and convenience of operation.





REMOTE CONTROL

In addition to push-button controls at the doorway, others may be added, at any number of convenient points, on motorized Kinnear Doors.

KINNEAR ROLLING DOORS

THE KINNEAR MANUFACTURING CO.
Factories: 1760-80 Fields Ave. • Columbus 16, Ohio
1742 Yosemite Ave., San Francisco 24, Calif.
Offices and Agents in all Principal Cities

German Industry Show In U.S. Supported By Export-Import Agency

New York

• • • **The "Germany '49—Industry Show,"** representing approximately 500 firms and 22 different industry groups from the three Western German Zones, will open Apr. 9 in the Museum of Science and Industry, Rockefeller Center, New York. The exhibition, which is supported by the Joint Export-Import Agency of Frankfurt, is scheduled to close Apr. 24.

The object of the exhibition is to extend and strengthen trade connections between the United States and Germany, JEIA said. The exhibition fund which has been established will make it possible for a certain number of exhibitors personally to represent their business interests in New York. The on-the-spot presence of German businessmen at the exhibition should offer a good opportunity to re-establish close and profitable contact with American purchasers, the agency said.

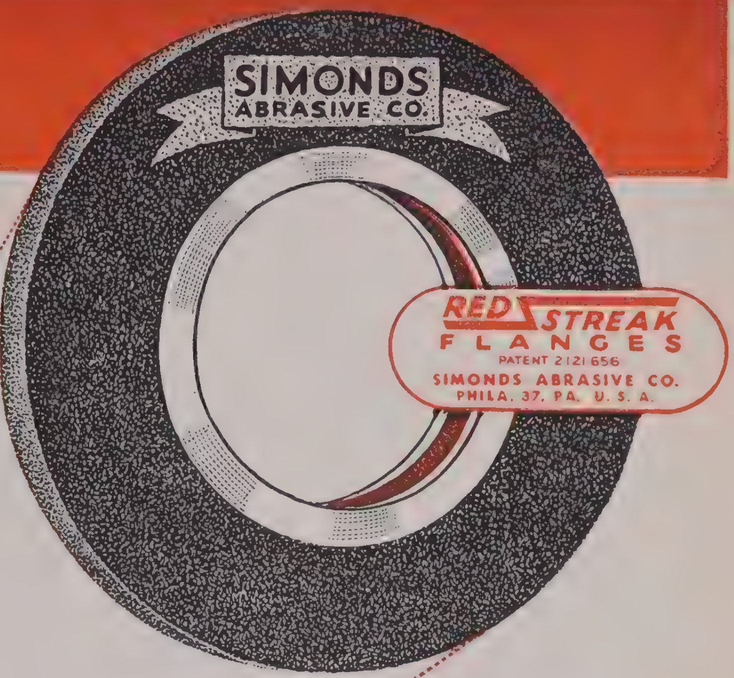
Interest in the exhibition on the part of West German exhibitors was, from the beginning, so lively that the exhibition space available was inadequate for the large number of applications. Because of this, certain space restrictions had to be made, both on the individual exhibitors and on the collective stands. It was finally decided that more than 100 individual exhibitors and about 33 collective displays would take part in the exhibition, the latter including approximately 400 different firms.

Principal exhibits will be the following: Electrotechnical products, precision and optical goods, clocks and watches, jewelry, toys, wooden articles, porcelain and glassware, leather goods, textiles, arts and crafts articles. Special machinery, tools and vehicles will also be represented.

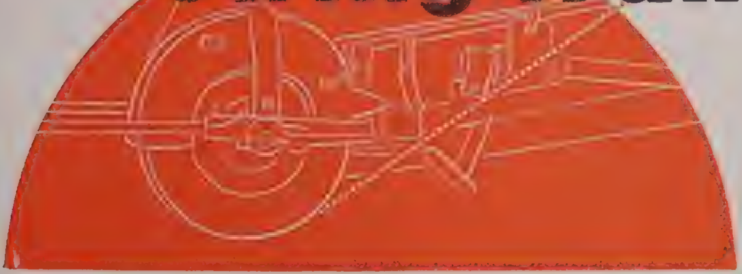
All details concerning the exibition are being handled by the firm Nordwestdeutsche Ausstellungsgesellschaft m.b.h. Dusseldorf, which has opened a Branch Office in Frankfurt, Gutleutstrasse 40.

SIMONDS
ABRASIVE CO.
PHILADELPHIA, PA.

Grinding Wheels



Try this on your swing frame grinder



For less machine wear. **Red Streak Flanges, an exclusive patented feature of this Simonds Abrasive Co. resinoid bonded snagging wheel, give better spindle fit (steel against steel) and reduce abrasive wear on machine parts.**

For better wheel action. **Mount center and flanges keep accurate for truer running, better balance and long lasting efficiency on production work.**

For economical results. **On the basis of wheel cost, life, stock removal, labor cost and overhead. Performance proved by actual tests!**

For top performance, low cost use Simonds Abrasive Wheels. Send for new Snagging Bulletin, Form ESA-62 for detailed information. Write now.

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Philadelphia, Pa.
Grinding Wheels and Abrasive Products

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OUT OUR WAY

OUR PRODUCT GLOWS IN THE DARK! IT'S SENSATIONAL!
YOU GUYS ARE WASTIN' YOUR TIME! I USE SOL-SPEEDI-DRI BECAUSE IT COVERS MORE, ABSORBS MORE, COSTS LESS TO USE!
THE PRODUCT I SELL CRACKLES AND POPS-- KEEPS EVERYBODY ON THE JOB WIDE AWAKE!
"GLOWS IN THE DARK--CRACKLES AND POPS!" THEY'VE GOT TO HAVE SOMETHING TO SAY-- 'CAUSE THEY CAN'T MATCH THE NEW IMPROVED SOL-SPEEDI-DRI!
YEH, CLAIMS NEVER DID DO SO GOOD AGAINST FACTS! AND THE OL' MAN'S GOT THE FACTS ABOUT SOL-SPEEDI-DRI!
T. M. REG. U. S. PAT. OFF. COPR. 1949 BY NEA SERVICE, INC.
HIGH PRESSURE
J.R.WILLIAMS

You Can't Beat the Facts!

New improved *SOL-SPEEDI-DRI* gives you *more volume* per pound.

New improved *SOL-SPEEDI-DRI* *covers more* floor area per pound.

New improved *SOL-SPEEDI-DRI* *absorbs more* liquids per pound.

YES, the new improved Sol-Speedi-Dri is more economical to use, because you get more bulk, more coverage, more absorption per pound.

★

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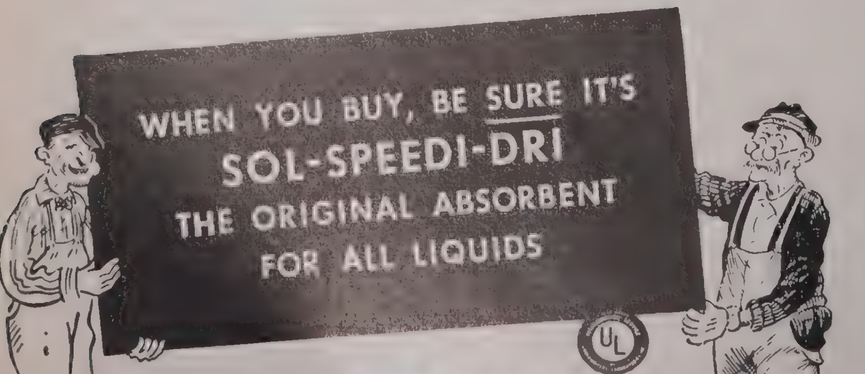
Warehouse stocks maintained in principal cities of the United States and Canada.


WHEN YOU BUY, BE SURE IT'S
SOL-SPEEDI-DRI
THE ORIGINAL ABSORBENT
FOR ALL LIQUIDS
UL
SOL·SPEEDI·DRI
ABSORBENT FOR ALL LIQUIDS

Scores New Labor Bill Predicts Fair Business

Chattanooga, Tenn.

• • • **R. C. Ingersoll,** president of the Ingersoll Steel Div. of Borg-Warner Corp., told the Southeastern Bankers' Assn. here recently that the Truman administration's proposed labor legislation "is the most serious immediate threat to the nation's economic health." Mr. Ingersoll warned that the new bill with its power to hamstring industry and its lack of restraints upon powerful labor monopolies could bring the worst type of depression.

The Chicago industrialist pointed out that the administration bill deletes from labor laws all responsibility on the part of unions to bargain collectively, to maintain their contracts and to refrain from mass picketing and from violence and coercion of nonmembers and non-strikers. "The bill repeals all restraints on shakedowns, feather bedding and the payment of union officials for work that is not performed. It goes back to the Wagner Act provisions which at one time were interpreted to abolish free speech and the right of an employer to talk frankly to his employees and to answer false charges," Mr. Ingersoll declared.

Except for the possibility of industry-baiting new labor laws having the effect of cutting off the flow of risk capital and inspiring major strikes, and a fourth round of wage increases, the Chicago manufacturer said he finds general business prospects for 1949 are good.

"The prosperity of 1948 probably will not be equaled during the next 5 years, but 1949 business should closely approach 90 pct of 1948's volume," Mr. Ingersoll predicted. He based his expectation of continued resistance to a depression on the nation's increased purchasing power and the increased consumption capacity, the large rearmament program, the many tremendous government projects and the heavy continuing demands of ECA.

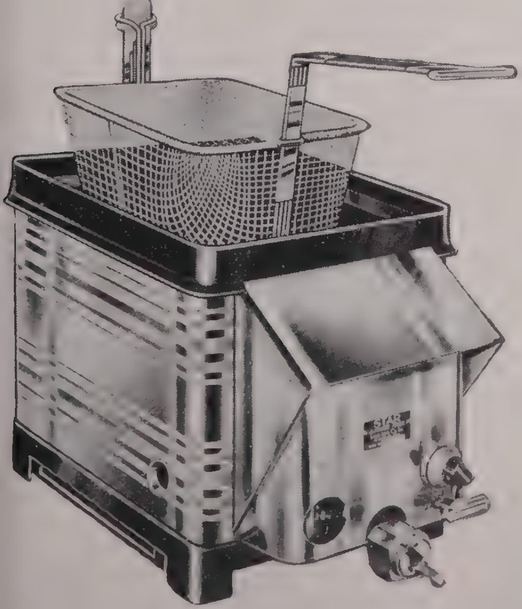
He also made mention of the fact that the present administration is committed to a high level of production even though it means deficit financing. He summarized immediate prospects in

RESTAURANT EQUIPMENT EMPLOYS NICKELOID METALS

Chrome Steel and other Nickeloid Metals are being widely adapted to functional use in the field of restaurant and refectory equipment. Reasons: the durable beauty, ease of cleaning, and speedier and more economical manufacturing inherent in these pre-plated metals. The Star Manufacturing Company, of St. Louis, has achieved some striking and successful effects in the Star line of equipment. Chrome Steel manufactured by the American Nickeloid Company has been largely employed. The modern, clean-looking, gleaming beauty of Star Equipment has fully justified the choice of these metals. They are high quality metals; yet low in cost. Available in sheets and coils, and in a wide variety of stripes and patterns. Base metals: Steel, Zinc, Copper, Brass and Aluminum. For information write: American Nickeloid Company, Peru, Ill.

STAR-MASTER FOOD SERVER

The Star-Master Food Server. Cooked foods placed in this server are kept hot and appetizing. Chrome Steel by American Nickeloid Company is used with the exception of the insets.



The Star Automatic Fryer. Chrome Steel gives it the clean, modern touch and serves a functional use. Compact and automatic.

AMERICAN NICKELOID COMPANY

PERU 2, ILLINOIS

Whatever equipment or product you manufacture, there is probably some adaptation for Nickeloid Metals. Write on company stationery for our free illustrated booklet showing hundreds of successful applications of these metals.

OUR PLANT ENGINEER
CALLED IT A
"POWDER PUFF FACTORY"

"We liked the location and the size, but when we figured on increasing crane capacity, the structure just wouldn't take it. Our plant man finally gave up in disgust saying, 'They must have built this shop for a powder puff factory.' "

"When we decided to build, you can bet we planned *in advance* against the possibility of a future need for greater crane capacity."

"The Shepard Niles specialist was a great help in this planning. He seemed to know just about what loads were maximum in different types of industry. We were guided, to a great extent, by his suggestions."

The time to plan for most economical materials handling is before the building is built or the remodeling completed. Ask the Shepard Niles specialist to sit in—he has lots of experience behind him—and his sales interest is not concentrated on any one type of lifting tool.

SHEPARD NILES
CRANE AND HOIST CORPORATION

Makes and sells all three lifting tools for airborne shop loads.

CRANES
OVERHEAD
HOISTS
FLOOR OPERATED
HOISTS
CAB OPERATED

356 SCHUYLER AVENUE • MONTOUR FALLS, N. Y.

several major industries by saying that steel will not be in full supply from regular sources until the latter part of the year and that most passenger cars will be in free supply by mid-1949, with all of them available for purchase by the end of the year.

Mr. Ingersoll expects the farm equipment industry to continue its full production at least throughout the year but that production in the household appliance field generally will be on a lower basis.

Mr. Ingersoll recalled that the inventories at the end of last year were at an all-time high and in many cases unbalanced, and that wholesalers' stocks had greatly increased. He said that these factors made some companies vulnerable if intense competition or a recession develops in their field.

He said to the bankers present "Put your houses in order by balancing and reducing inventories and watching credit." The industrialist went on to warn them against the drift toward socialism and said that the leftist trend has been accelerated during recent months.

Renovates DC-3 Transports

Los Angeles

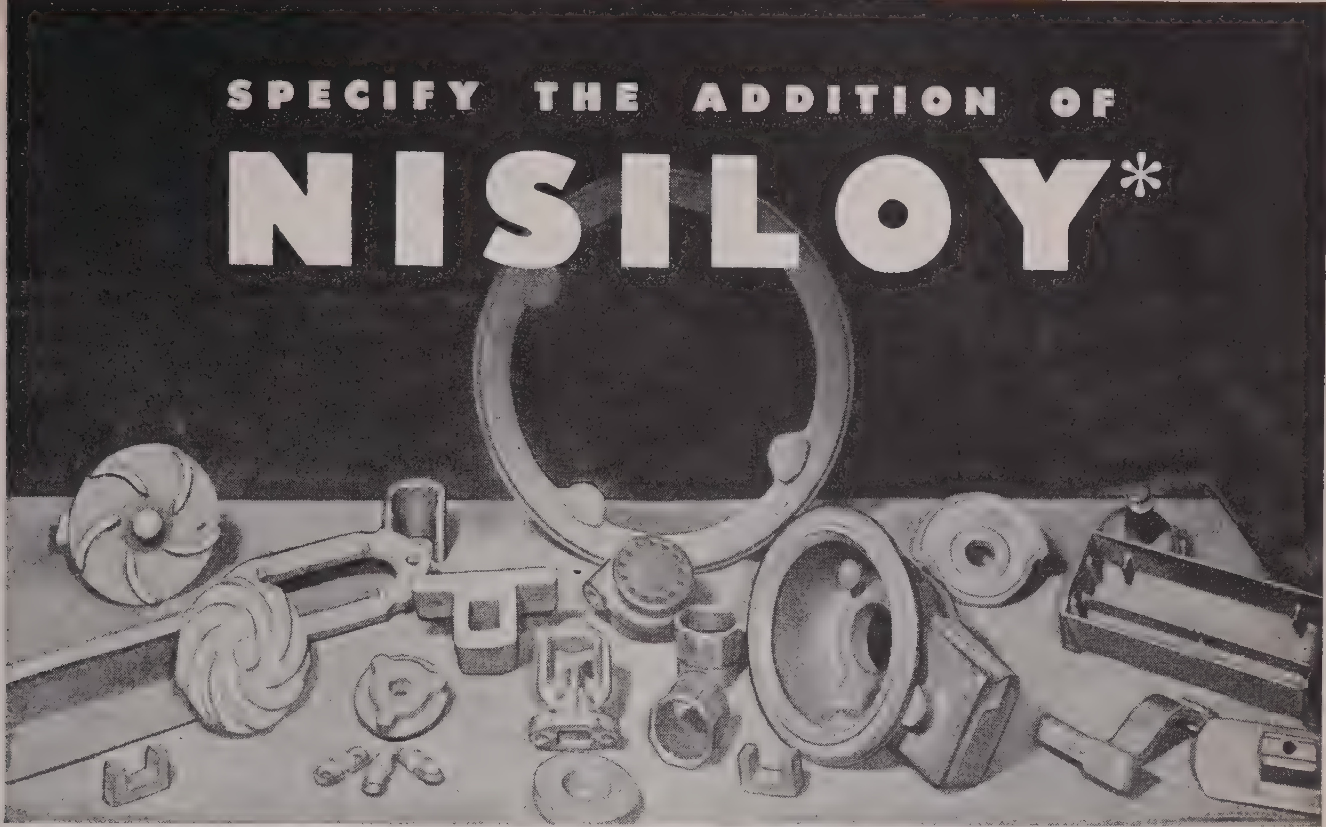
• • • **Something like** 6000 DC-3 transports can be given the "new look" by Douglas Aircraft Co. if their owners want to increase payload, speed and operating efficiency.

It is estimated that about 50% of these planes—known as the C-47 in military service—are now in the air on commercial lines and that the army still has about 3000 of them in use. Others are in private hands.

Renovation of the "work horse" involves higher-powered engines which will increase speed about 45 mph to 234 mph; structural improvements; square tipped wings; increase in gross weight of from 25,200 lb to 27,300 lb; improved controls; enclosing retractable landing gear; and increasing passenger capacity to 26 or 28 instead of the present 21. The DC-3 is licensed by CAA until 1953 and renovation will considerably extend that period.

SPECIFY THE ADDITION OF

NISILOY*



Chilling and consequent machining difficulties were encountered by a foundry specializing in cast parts like these, designed with both heavy and light sections. Nisiloy, added to the ladle, assured ready machinability after many other experiments failed.

for Better Machinability in GRAY IRON CASTINGS

Casting users profit from use of Nisiloy . . . a new, powerful, positive inoculant that promotes better machinability. It contains about 60 per cent nickel, 30 per cent silicon, balance essentially iron.

Faster, easier, lower-cost finishing of gray iron castings may be attained because Nisiloy serves to eliminate localized hard areas or chilled (white) edges and surfaces . . . regardless of sharp variations in section thickness.

Get full information. Send for *your* free copy of a booklet that describes how the dense, gray, machinable structure secured with Nisiloy reduces machining time, tool wear, rejects and costs. Mail the coupon now.

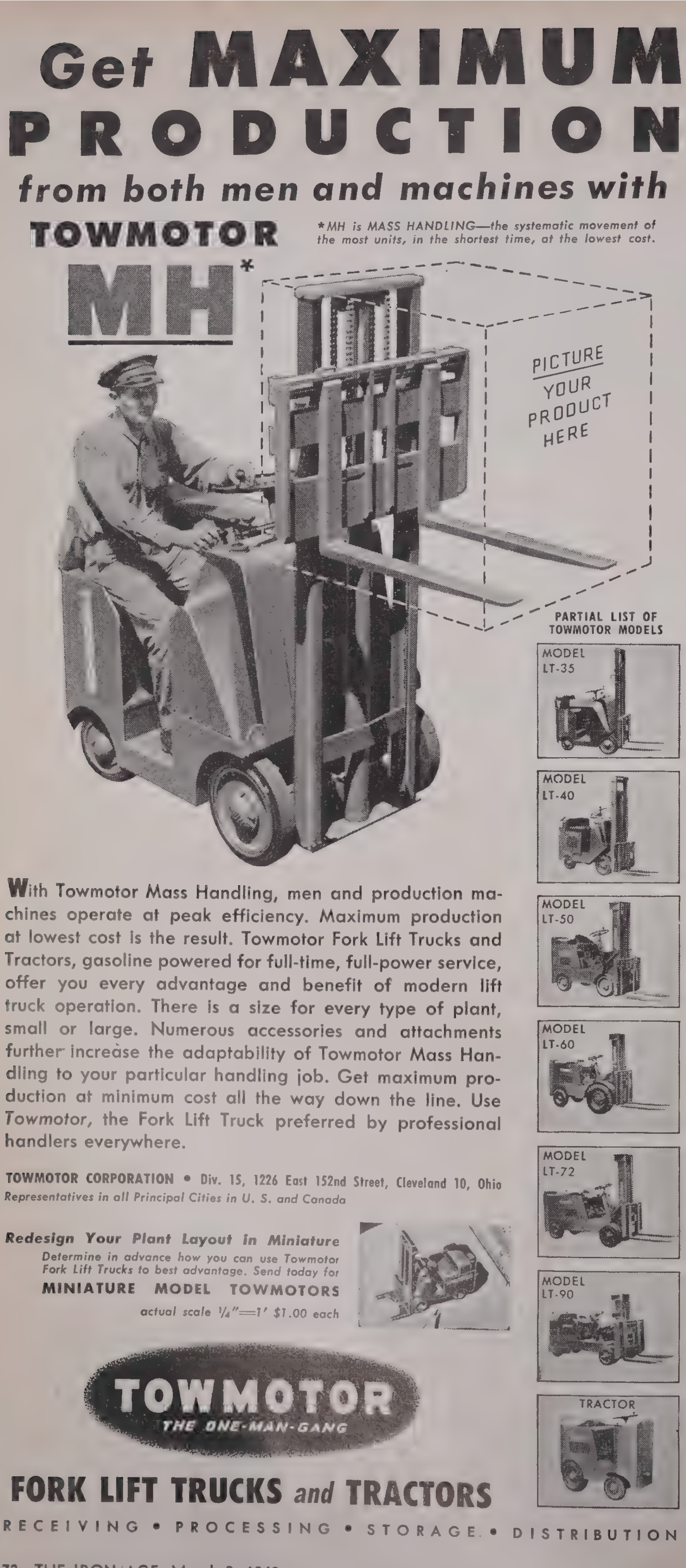
*Trade-mark of the International Nickel Company, Inc.

EMBLEM OF INCO SERVICE
TRADE MARK

The International Nickel Company, Inc.
Dept. I.A., 67 Wall Street, New York 5, N. Y.
Please send me your booklet entitled
"NISILOY" for GRAY IRON CASTINGS.

Name..*Title*..................
Company..
Address..
City..*State*..................

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET
NEW YORK 5, N. Y.



Get MAXIMUM PRODUCTION from both men and machines with TOWMOTOR MH*

*MH is MASS HANDLING—the systematic movement of the most units, in the shortest time, at the lowest cost.

PICTURE YOUR PRODUCT HERE

PARTIAL LIST OF TOWMOTOR MODELS

MODEL LT-35

MODEL LT-40

MODEL LT-50

MODEL LT-60

MODEL LT-72

MODEL LT-90

TRACTOR

With Towmotor Mass Handling, men and production machines operate at peak efficiency. Maximum production at lowest cost is the result. Towmotor Fork Lift Trucks and Tractors, gasoline powered for full-time, full-power service, offer you every advantage and benefit of modern lift truck operation. There is a size for every type of plant, small or large. Numerous accessories and attachments further increase the adaptability of Towmotor Mass Handling to your particular handling job. Get maximum production at minimum cost all the way down the line. Use Towmotor, the Fork Lift Truck preferred by professional handlers everywhere.

TOWMOTOR CORPORATION • Div. 15, 1226 East 152nd Street, Cleveland 10, Ohio
Representatives in all Principal Cities in U. S. and Canada

Redesign Your Plant Layout in Miniature
Determine in advance how you can use Towmotor Fork Lift Trucks to best advantage. Send today for
MINIATURE MODEL TOWMOTORS
actual scale 1/4"=1' $1.00 each

TOWMOTOR
THE ONE-MAN-GANG

FORK LIFT TRUCKS and TRACTORS

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

Canadian Output Of Iron, Steel Shapes Serves Various Users

Toronto

• • • **Canadian production** of primary iron and steel shapes for the month of November totalled 294,228 net tons as compared with 307,187 tons in October and 272,265 tons in November, 1947. Output for November included 284,888 tons of carbon steel shapes and 9340 tons of alloy steel shapes. In the production figures for November are included 77,274 tons of shapes shipped to producers own plants or plants within the primary industry for further processing.

Shipments for sale of primary iron and steel shapes in November amounted to 219,363 net tons, of which 209,793 tons were carbon steel shapes and 9570 tons alloy steel shapes; in October shipments totalled 236,424 tons and included 222,767 tons of carbon and 13,657 tons of alloy steel shapes, and for November, 1947 shipments amounted to 208,402 tons including 198,130 tons of carbon and 10,272 tons of alloy steel shapes. The above figures, which show iron and steel shapes for sale, do not include deliveries for further processing.

New Electrical System

Detroit

• • • **If your new** 1949 Chrysler, Dodge, De Soto or Plymouth fails to operate it won't be because of electrical trouble.

Chrysler will have a completely redesigned, moisture-proof and splash-proof electrical system on its new model cars. According to Chrysler engineers the changes have been made to provide easier starting, improved low-speed engine operation and to make the system entirely moisture- and splash-proof.

On the new model cars, the distributor has been completely redesigned. The spark plugs have a built-in resistor to reduce spark gap growth. The new ignition system has a heavy-duty ignition coil and special spark plug covers. Flexible plastic nipples seal the connections of the ignition cables to the coil and distributor.

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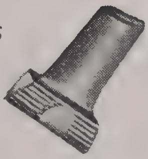
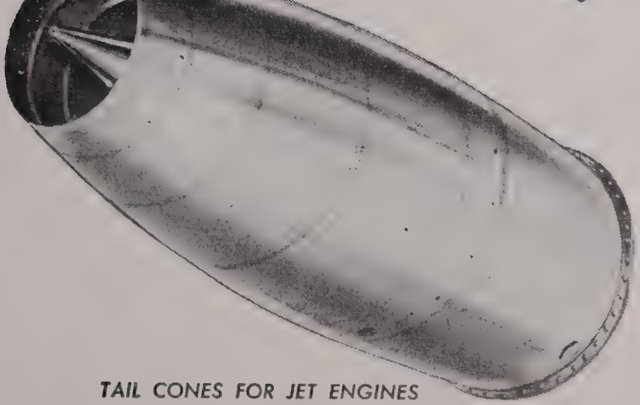
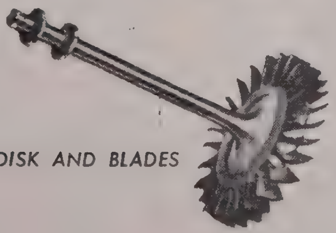
TYPICAL APPLICATIONS OF HIGH-TEMPERATURE ALLOYS

BLADES FOR JET ENGINES





TAIL CONES FOR JET ENGINES



GAS TURBINE SHAFT, DISK AND BLADES

What does it take to make a super-alloy?

Most of the so-called "super-alloys" that have been created for high-temperature service are made up of several metals so that it is almost impossible to say which should get most credit for each of the desirable properties that the alloys have. Many contain tungsten, which increases the hardness and the strength of the alloys at high temperatures. Creep strength shows improvement, too.

The percentage of tungsten in these high-temperature alloys depends upon the physical properties desired and the service temperatures to be met. All of the alloys can be readily cast and some can be forged and rolled without difficulty. Some typical applications in gas engines are rotors, exhaust stacks, tail cones, and turbine blading.

For the manufacture of high-temperature alloys, "Electromet" supplies a high-quality ferro-tungsten conforming to A.S.T.M. Specification A144-39. This ferro-alloy contains 70 to 80 per cent tungsten and a maximum of 0.60 per cent carbon. It is available for immediate delivery in a crushed size of ¼ inch by down which is suitable for all electric furnace additions.

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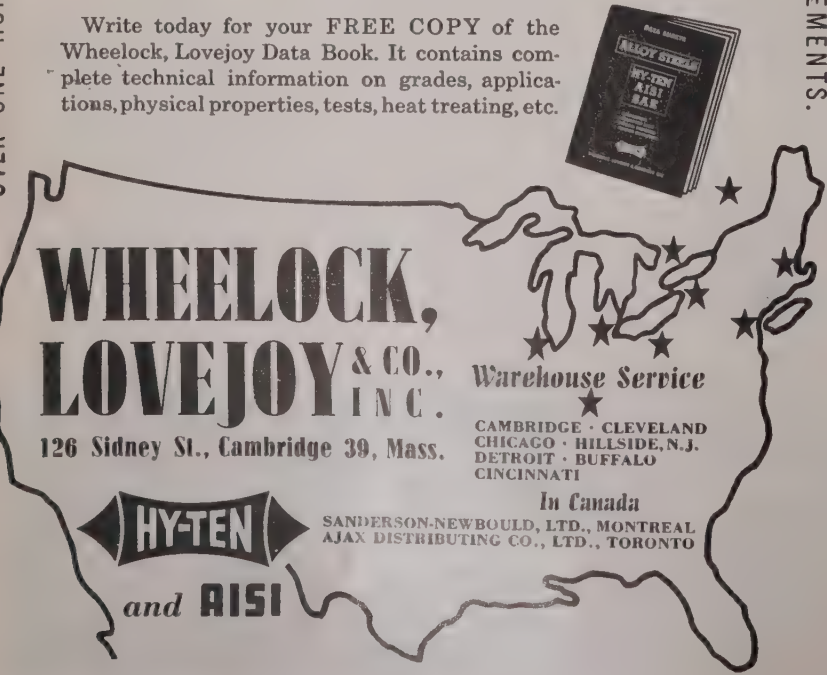
The selection of alloy steel grades necessarily varies with each manufacturer's needs and opinions. Some prefer HY-TEN alloy steel, while others recommend standard A. I. S. I. steel. However, differences in choice need not mean different sources of supply . . . just contact the Wheelock, Lovejoy warehouse nearest you. There you will find all grades of HY-TEN alloy steel as well as standard A. I. S. I. . . . grades to meet every need and opinion. By dealing with Wheelock, Lovejoy, you have the advantage of prompt delivery from a nearby source, plus courteous help from men who know metallurgy.

WL *steels are metallurgically constant. This guarantees uniformity of chemistry, grain size, hardenability—thus eliminating costly changes in heat treating specifications.*

Write today for your FREE COPY of the Wheelock, Lovejoy Data Book. It contains complete technical information on grades, applications, physical properties, tests, heat treating, etc.



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HY-TEN and AISI

Farrel-Birmingham Finishes Equipping Pattern Department

Ansonia, Conn.

• • • With the completion of a newly equipped pattern shop, Farrel-Birmingham Co., Inc., Ansonia, Conn., has rounded out a postwar program of plant improvement that represents an investment of about $1 million. In addition to bettering the working conditions of its 400 employees in the pattern-making department and the Ansonia and Derby Foundries of the company, the improvement program was designed to improve the efficiency of plant operation and to put the company in a better competitive position.

The pattern shop has been almost completely equipped with new machinery, installed in a central line and in duplicate setup. An under-floor exhaust system removes all dust when the equipment is in operation. The pattern shop project is an accomplishment of the past few months, but improvements to the foundries proper were started in 1946.

Two new recirculating ovens, one for molds and one for chills, were installed at the Ansonia foundry. Six new roll pits were built, two 12 ft deep, two 16 ft deep, and two 20 ft deep, designed for less hazardous operation and for better production of chilled iron rolls. A chill cleaning cabinet with an exhaust system was also installed, and other new equipment included an electric furnace for melting alloys, a sand mixer, two sand conditioning machines, new bridge cranes in the core room, a new 86-in. cupola, mechanical charging for all cupolas, a new centrifugal blower, and a new air furnace and pig casting machine.

At the Derby foundry, the foundry building was overhauled completely. Mechanization and betterment of working conditions followed the installation of a modern shakeout unit. A stationary sandslinger for ramming backing-up sand into large molds was added, as were a new mold drying oven, several new core drying ovens in an entirely new core room, and cranes, runways, overhead sand buckets, and other auxiliary equipment.

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BRANDT
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• heavy weldments
• pressed steel shapes
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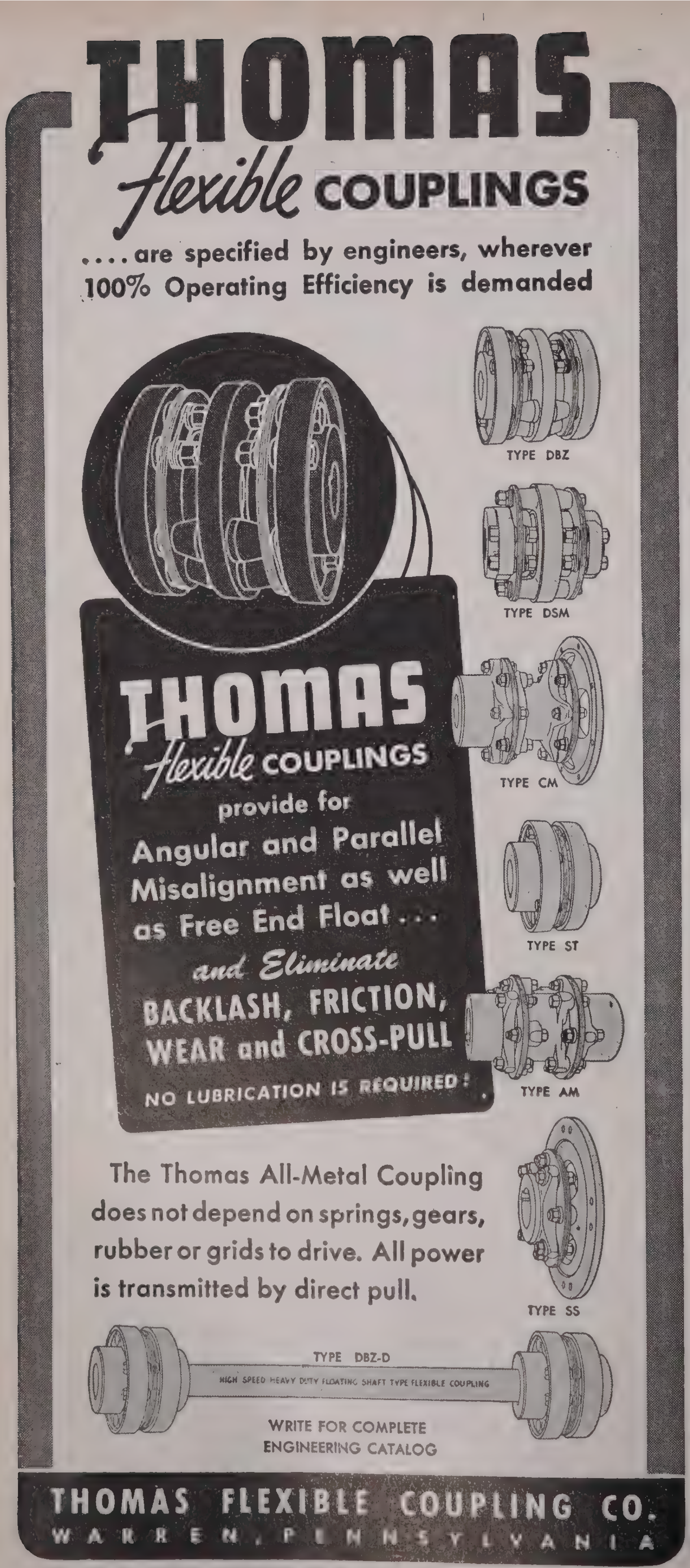

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THOMAS *flexible* COUPLINGS provide for Angular and Parallel Misalignment as well as Free End Float...

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NO LUBRICATION IS REQUIRED!

The Thomas All-Metal Coupling does not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.

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THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

Airline Group Approves Better-Packing Program

Mansfield, Ohio

• • • "The nation's airlines are pleased at the opportunity to work with all those who are a part of the Porcelain Enamel Institute 'safe-transit' program," Emory Johnson, secretary of Air Cargo, Inc., assured members of the PEI-sponsored Packaging and Shipping Committee at a recent meeting here. Air Cargo's official endorsement completes the list of national air and land carrier associations—all of which are now actively participating in an industry-wide program for reduction of in-transit damage to finished appliances and allied metal products.

Air Cargo, Inc., is owned by the nation's certificated air lines and performs certain ground services for them.

The cooperative "safe-transit" program for reducing shipping losses to finished appliances and allied metal products is sponsored by the Porcelain Enamel Institute and carried out by an industry Packaging and Shipping Committee. With the help of carriers, shippers, and other interested industry representatives, the PEI Packaging and Shipping Committee has developed equipment and procedures for determining, before shipment, the ability of finished packaged-products to withstand shocks incurred in handling and transportation.

Foundry Conference Held

Birmingham

• • • A three-day foundry practice conference of the Birmingham District Chapter, American Foundrymen's Society, opened here Feb. 17.

On the agenda were technical sessions, extensive plant visitations and an annual banquet.

Technical session speakers and their subjects were: C. K. Donoho, chief metallurgist, American Cast Iron Pipe Co., Birmingham, "Nodular Graphite Cast Irons"; W. B. Wallis, president, American Foundrymen's Society and Pittsburgh Lectromelt Furnace Corp., Pittsburgh, "Activities of A.F.S."

M. O. Booth, plant manager, and W. A. McCarthy, supervisor of standards, Saginaw Malleable Iron

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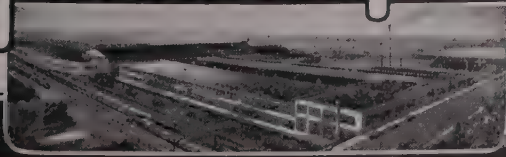

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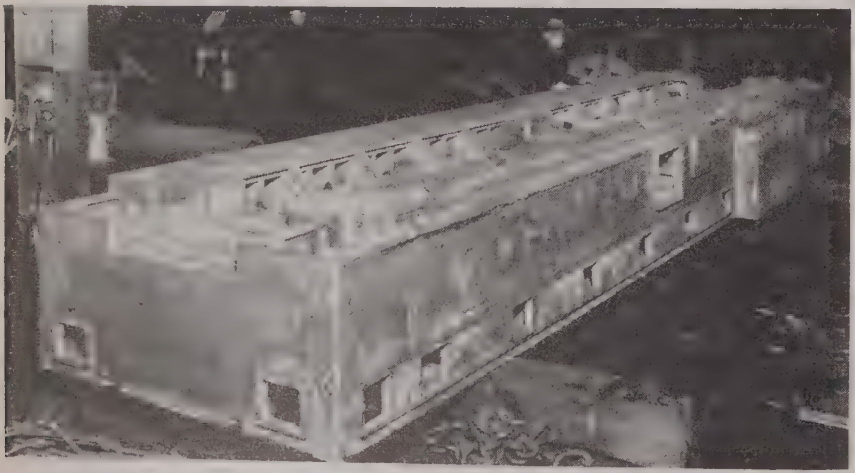

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It takes considerable gumption to design a 20-ft. grinder bed. Many things could go wrong in casting such a monster. But the designer of this bed had confidence in our ability to cast it without distortion and structural defects—and that's what we did.

In many instances, ADVANCE CASTINGS are shipped considerable distances because our customers have found that it pays to go far for dependable foundry work. The cost of transportation—in fact, the entire cost of a casting—is insignificant compared to the extra machining costs which would be incurred in working up a casting that developed blow-holes, hard spots, sponginess, etc.

The character of our castings became widely known through *Strenes Metal* cast dies. We employ the same techniques in custom foundry work. If you want the evidence, write or phone us.

ADVANCE CASTINGS
THE ADVANCE FOUNDRY CO.
DAYTON 3, OHIO

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Plant, General Motors Corp., Saginaw, Mich., "Progress With Motion Study and Better Methods"; J. W. Cable, high frequency consultant, Thermex Div., Girdler Corp., Louisville, Ky., "Foundry Core Baking by Dieelectric Heating."

W. H. Johnson, metallurgist, Naval Research Laboratory, Washington, D. C., "Gating Systems for Castings"; Harry W. Dietert, president, Harry W. Dietert Co., Detroit, "Relationship Between Casting Defects and Elevated Sand Properties."

Speaker at the annual banquet held Feb. 18 was Dr. John M. Gallalee, president of the University of Alabama.

Founders Offer Bulletin

Cleveland

• • • **A new technical** bulletin service to Gray Iron Founders' Society members was announced this week by C. O. Burgess, technical director of GIFS.

The first of the series of these bulletins discusses the oxidation and growth-resistance of high-silicon gray iron. Others already scheduled for distribution cover the use of gray iron in the tool and die industry and current data on properties and production of nodular graphite iron.

While a definite schedule for the release of such bulletins has not been established, Mr. Burgess stated that such bulletins will be issued as important technical information becomes available.

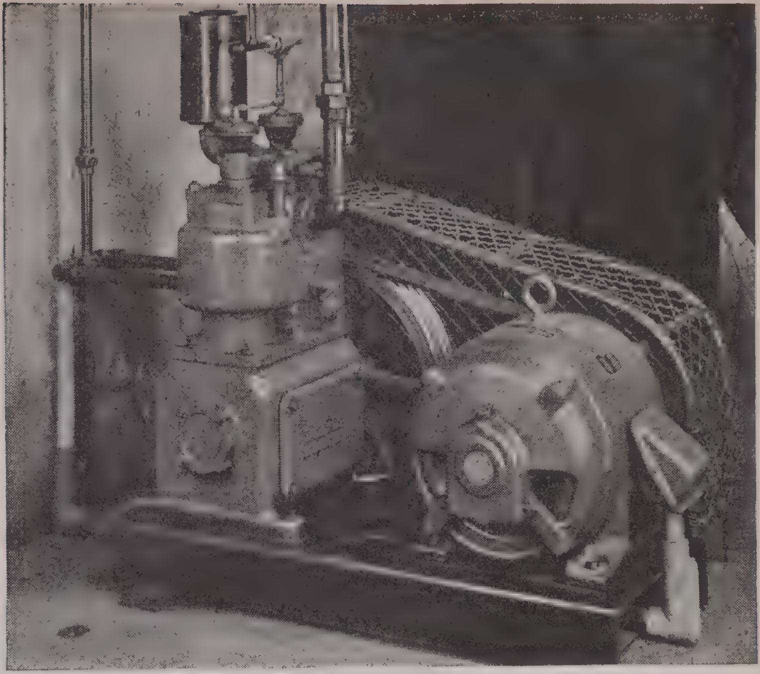
To Study Fastener Boxes

Pittsburgh

• • • **The American** Institute of Bolt, Nut & Rivet Manufacturers may standardize shipping containers as a result of a study showing that its members use 218 different sizes of shipping cases, no two alike. The study led the institute's packing committee to appoint James O. Peck Co. to make a field survey on which simplified practice recommendations can be based.

It is felt that there is a lot of room for simplification of packaging among the institute's 17 member companies. The Peck company will investigate the problem as it affects transportation firms, warehouses, distributors and retailers.

Curtis Timken Bearing Air Compressor. Sizes from ¼ to 50 H. P., inclusive.



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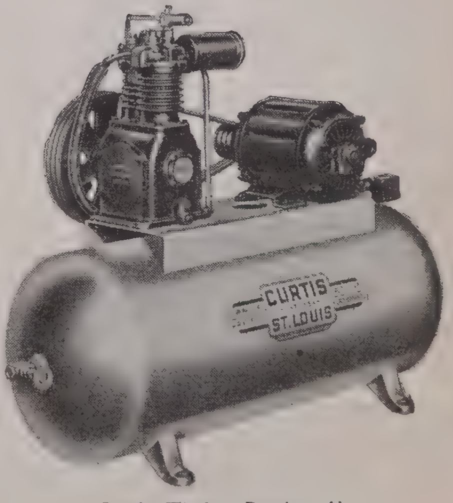

Curtis Timken Bearing Air Compressor with tank. Sizes from ¼ to 10 H.P., inclusive.

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Responsibility for Work Rests With Sales Groups

New York

• • • More than 400 executives representing firms in all sections of the country manufacturing or distributing industrial and consumer products will meet here, March 17 and 18, to discuss sound marketing practices and techniques which will maintain and satisfy the high level of demand necessary to continue the economy at its present level. The meeting will be sponsored by the Marketing Division of the American Management Association under the direction of William E. Jones, AMA marketing vice-president.

In announcing the meeting Mr. Jones, who is also sales vice-president of the Scranton Lace Company, said the AMA Marketing Council believes much of the responsibility for continuing full employment rests with the sales organizations of American industry. He said the future depends on the ability of sales executives to insure the wide, economical distribution of high quality products to all their potential markets at attractive prices.

Tight Supplies of Power Affect Steel Production

New York

• • • Conversion from steam to electric power, now almost complete, has made the iron and steel industry the second largest industrial user of electricity. It is exceeded only by chemical manufacture, according to the American Iron and Steel Institute. However, the operation of mill motors and electric furnaces was restricted at times during 1948 in order to ease the drain on public power lines during peak loads in certain areas.

The importance of electricity in the production of steel is also indicated by the size of some of the steel plant motors, an individual motor on the main drive of a rolling mill having as much horsepower as a locomotive hauling a streamlined train.

A continuous mill turning out an average of about 150 tons of strip per hr uses approximately

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Our men have accumulated many valuable years of experience. Enlist their experience the next time you need screw machine parts. Send us your prints today

BAR CAPACITY
3/64" to 5 1/2"dia.

ALL SECONDARY OPERATIONS

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CORPORATION
Amherst, Ohio

Can you take advantage of this REAL ECONOMY?

THIS 2" TURRET LATHE

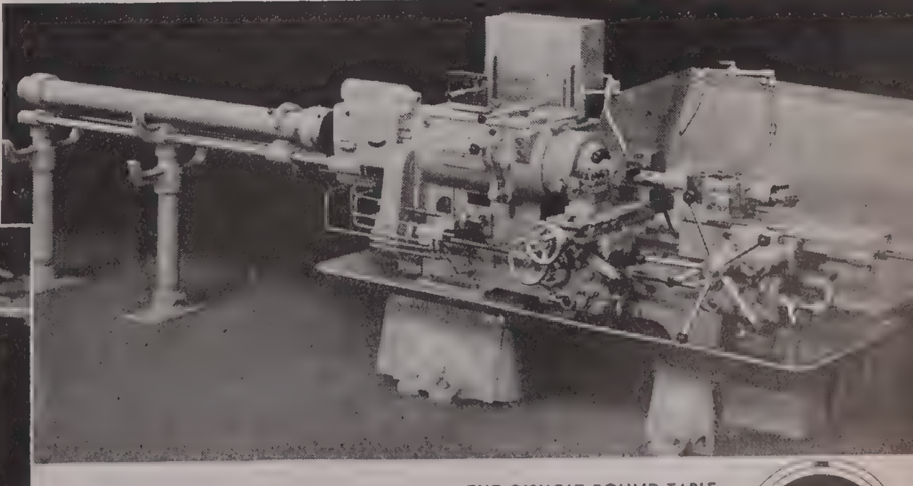
HAS 4½" COLLET CAPACITY for tubing, plastics and lightweight bar stock

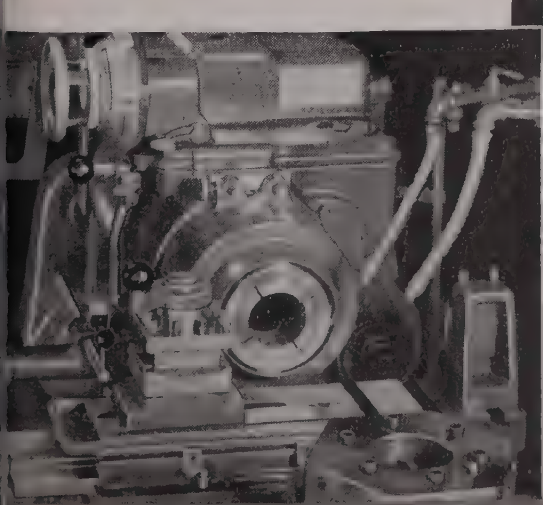
GISHOLT No. 4 UNIVERSAL RAM TYPE TURRET LATHE

You don't have to invest in expensive heavy-duty lathes to handle large diameter work of this nature. Here is the ideal lathe to machine tubing, plastics, or lightweight bar stock such as aluminum. You can use it for softer metals like brass, too.

The Gisholt No. 4 Ram-Type Turret Lathe (normally 2" bar capacity) can be furnished with a larger spindle bore providing 4½" round collet capacity. This machine gives you all the modern operating advantages which mean high speed production and low costs. It may be the economical solution to your problem. Ask your nearest Gisholt representative about it. Or write us for complete information.

GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

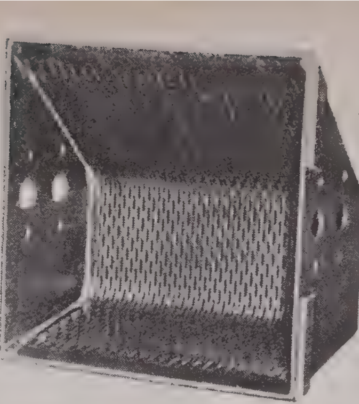




The Gisholt No. 4 Ram-Type Turret Lathe with 4½" round collet capacity and equipped with 4½" bar feed. (At left) Close-up view of 4½" capacity collet chuck. This machine is ideal for large diameter tubing.

THE GISHOLT ROUND TABLE **represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.**

TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES



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Hendrick is exceptionally well equipped to manufacture to specifications a wide range of metal products that involve such operations as perforating, shaping, forming, welding, brazing, riveting, etc. The perforated elevator bucket illustrated is typical of the many specialized articles for whose fabrication Hendrick has unusual facilities. Write in detail regarding any metal product you desire fabricated.

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KRANE KAR handles loads at Sides as well as at Front.

THE ORIGINAL SWING-BOOM MOBILE CRANE WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER
1½, 2½, 5, AND 10 TON CAPACITIES
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13,000 kilowatt-hours of electricity per hour, or as much electricity in about six minutes as a home uses in a year.

Many other kinds of equipment are powered electrically, including such auxiliaries as cranes, cold rolling mills and blowers. Electric furnaces also use an enormous amount of current.

Conversion of a single wide plate mill from steam to electric power, as recently announced by one company, will cost over $1.7 million and require a year or more.

Power supply at times has been particularly tight in three steel centers, Pittsburgh, Cleveland and Chicago. Because of the rapid growth in the manifold uses of electricity, public utilities have been hard-pressed to keep up with demand. They are in the midst of a great expansion program, scheduled to continue at least three years.

Warns Tool Steel Industry To Weigh Waltham's Fate

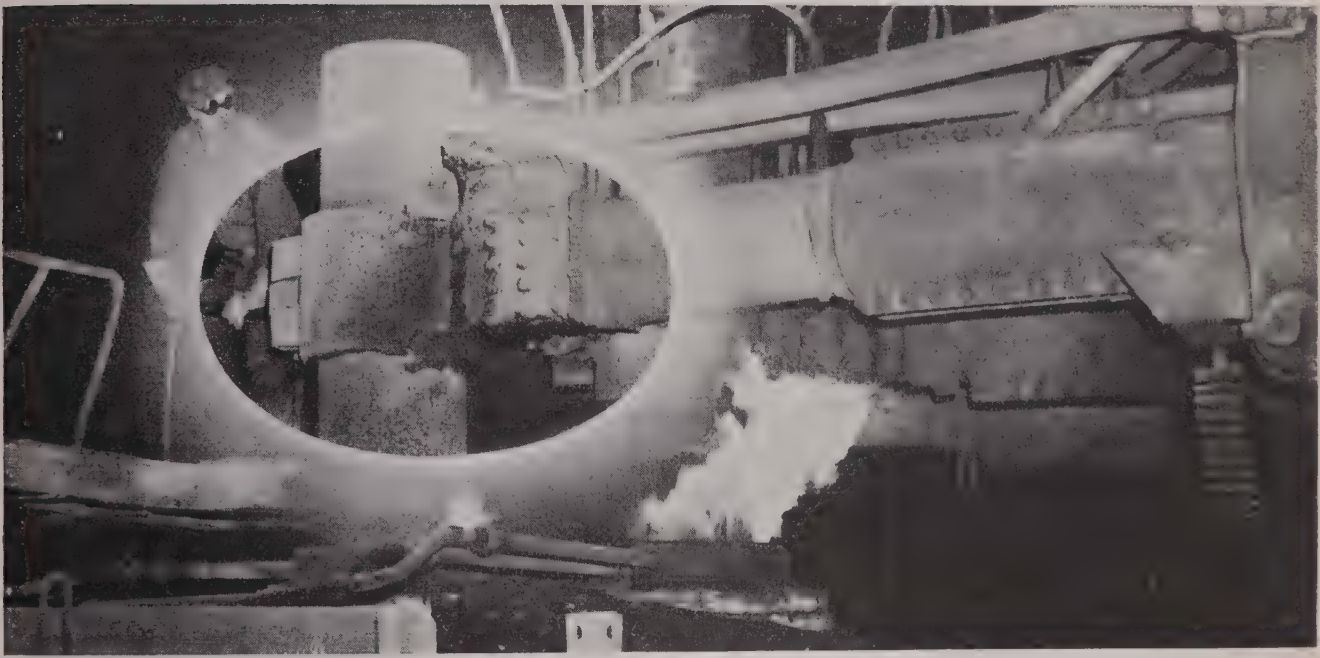
Latrobe, Pa.

• • • **Citing the** troubles of the Waltham Watch Co., Roy C. McKenna, board chairman, Vanadium Alloys Steel Co., said recently that only greater diversification of the tool and fine steel industry lessens its hazard from foreign competition. In a letter to members of that industry, dated Feb. 3, Mr. McKenna described the damage done to Waltham by importation of Swiss watches.

J. Heber Parker, chairman of the board, Carpenter Steel Co., and A. T. Galbraith, vice-president, Crucible Steel Co. of America, serve with Mr. McKenna as a committee on tariff for the tool and fine steel industry. Mr. McKenna's letter stated that they had suggested he write its members on this subject.

Mr. McKenna urged that industry members tell their employees the extent to which their jobs depend on a protective tariff. Industry, he said, has supported a flexible tariff; has never opposed world trade. But, he asserted, one of the worst features of the Trade Agreement Act is that any concession given to a relatively high-cost country is automatically extended to all others.

How Tough Can a High Conductivity Casting Be?



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When you need *outstanding* physical properties in a casting for high conductivity applications, *Mallory 3 is your answer.* Special heat treatment gives Mallory 3 physical properties superior to those normally encountered in cast brasses and bronzes for high conductivity applications.

Mallory 3 is one of a series of special alloys developed by Mallory to meet industry's demand for materials with special physical properties, and it is available in cast form. Mallory engineers will advise you on your particular problem. Just let us know the physical requirements of your application.

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Power Supplies
Resistance Welding Materials

*Reg. U. S. Pat. Off.

Interior Dept. Seeking To Rent 200 Buildings

Washington

• • • The Interior Dept. is seeking industrial renters for approximately 200 one-story buildings, operated as part of the Illinois Ordnance Plant in wartime. They are located in Williamson county in southern Illinois.

The facilities for lease vary in floor space from 1200 sq. ft. to 27,000 and rental charges will range from 15c to 20c a sq. ft., depending on types of construction.

Pointed out by Interior as lures to potential tenants is the fact that water, electricity, sidings, switch engines, and numerous other facilities are available. As an example of the type of industries which might operate, Interior says 12 companies already have leased plants.

These include Sangamo Electric Co., employing 525 workers, the Diagraph-Bradley Industries and the Hoosier Cardinal Corp. Among the remainder are a maker of window frames and moldings, an electric parts manufacturer, an iron casting firm, and a metal finishing concern.

Full information may be obtained from the Industrial Manager, Crab Orchard National Wildlife Refuge, Carterville, Ill.

The industrial area of 20,000 acres was built in 1941 and operated as a loading facility for high explosive shells and bombs.

Equipment Backlog Better

Pittsburgh

• • • Increased manufacturing capacity and technical improvements on the production line are sharply reducing abnormal postwar backlog of orders for most types of electrical equipment, according to Tomlinson Fort, manager of Central Station Sales for the Westinghouse Electric Corp.

Delivery time has been cut materially and many types of electrical equipment now can be secured from warehouse stocks. In many ways business is shifting back to a normal basis. However, this shift is being made to a plateau far higher than before.

The New

XACTLINE

STRAIGHT LINE TEMPERATURE CONTROL

For Use With Pyrometer Controllers

Anticipates Temperature Change Eliminates Overshoot and Undershoot

Now with XACTLINE Straight Line Temperature Control you can increase the efficiency of your Pyrometer Control Instruments (either Millivoltmeter or Potentiometer Type) to an amazing degree. Now you can hold tolerances as close as 1/5°F. plus or minus and power "on-off" cycles as low as 3 seconds.

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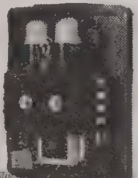
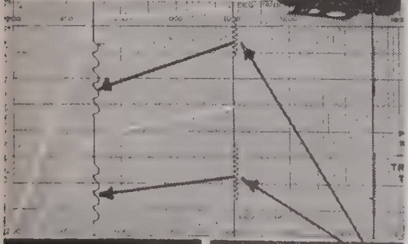
This *Anticipation Factor* means that XACTLINE causes the conventional pyrometer controller to respond to a millivoltage impulse up to 90% less than that normally required, (the controlling pyrometer functions *only* when the desired temperature range has *already* been exceeded).

- XACTLINE is laboratory tested and adjusted . . . does not require readjustment or coordination with other controllers.



NO gears, cams, shafts, bearings or other rotating or sliding parts. Simple design eliminates usual maintenance and repair.



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Marshall Plan Seen Big Disappointment In Stockpiling Items

Washington

• • • **The Marshall Plan,** once visioned as an important source for needed stockpiling items, has been a big disappointment so far in actual practice.

At the start of 1949, after 9 months of ECA, four actual purchase agreements had been made. These totalled $21,600,000.

A number of additional deals were in the works, according to ECA. Some involved further purchases. Others merely concerned exploration and development projects.

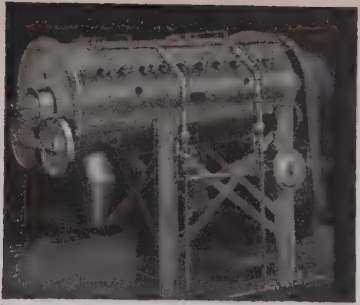
Reasons are many and varied. The ECA has had officials in Europe, working on the matter, since last August. But the agency is largely limited to locating items and arranging purchases. Marshall Plan dollars as such cannot be used for outright deals although limited use can be made of the counterpart funds.

One major reason for the buying lag is that ECA is limited to dealing with only Marshall Plan nations. These have limited or no supplies of scarce materials, particularly shortage items on the A and B lists of the Munitions Board. What they do have is mostly needed for their own recovery. Some have potential production but much of this remains to be developed.

After months of digging into the matter, ECA has found that the items most likely to be obtained from these countries and dependencies are largely limited to tin, cobalt, diamonds, flake graphite, tungsten, antimony, mercury, bauxite, phlogopite, and possibly columbite, tantalite and corundum.

Operations of the ECA special mission, which included a mining and a transportation consultant as well as a representative of the FBS, can roughly be summarized as follows:

Purchases of rubber and sisal were made with the UK and groundwork laid for expansion of Gold Coast manganese production. Tentative arrangements have been made with Holland for future purchases of bauxite.



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ADAPTABLE to many types of operations, A.G.F. Continuous Rotary Heating Furnaces are used for clean hardening, annealing, normalizing, carburizing, case hardening by the patented Ni-Carb process, and other types of general and atmosphere work.

WORK HEAT TREATED in these furnaces ranges from small pins and bearing parts up to heavy forgings for universal joints, which are normalized in the larger rotaries. These furnaces also find application in the process industries for calcining carbonates and nitrates, burning garnet grain, and similar processes.

UNIFORM HEATING is assured by the gentle mixing of the work as it passes through the rotating retort. The speed of rotation is controlled by a stepless variable transmission, permitting quick and exact adjustment of the time-temperature cycle.

ATMOSPHERE CONTROL is complete and positive. The atmosphere gas is introduced through a simply-designed, trouble-free connection.

LONG LIFE of the alloy retort is assured by the fact that it remains within the heat at all times. Only the work enters and leaves the furnace.

ECONOMICAL OPERATION is secured by the thick lining of insulating refractory, backed by block insulation. Firing by means of many small burners keeps fuel efficiency high, heat losses low.

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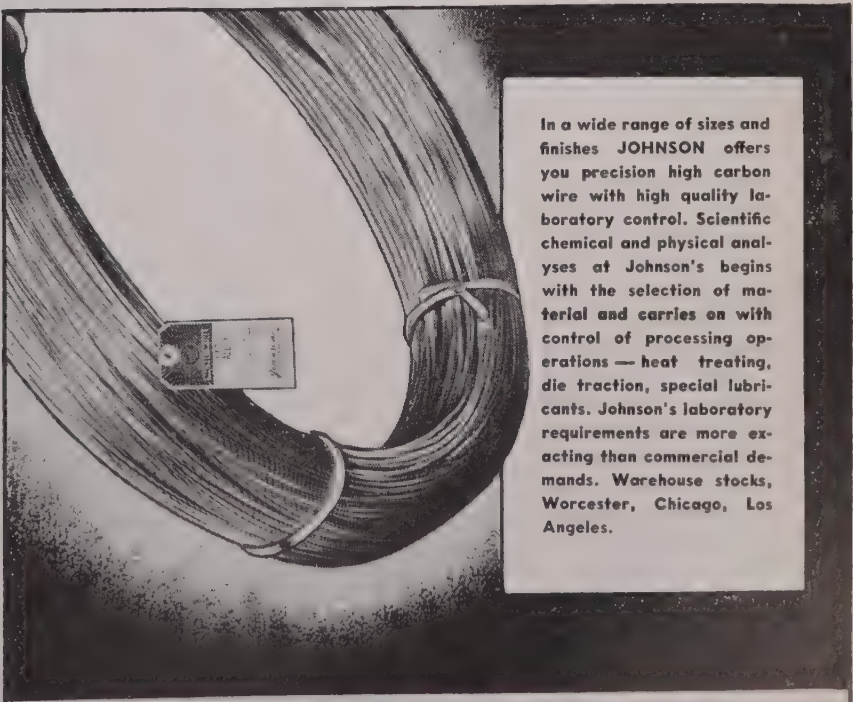

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Spadework has been done with France for obtaining "substantial" amounts of Madagascar flake graphite.

Also, a start has been made toward having Britain obtain chrysotile and amosite from outside sources which the UK would then exchange for ECA goods. American capital is being sought for expansion of lead production in North Africa, tin in the French Cameroons, lead in the French Congo, and nickel in New Caledonia and the Celebes.

The outlook for obtaining some of the important strategic materials through ECA operations, as of the end of 1948, can be summarized generally as follows:

Cobalt: Delivery for the stockpile from the Belgian Congo will begin this year. Already accounting for 60 pct of the world supply, the Congo would substantially expand production if and when an extended market is assured. Expansion of Rhodesian production is also under study. ECA says Moroccan cobalt cannot be exported at present world prices.

Columbite: Principal Marshall Plan source is Nigeria. Once the greatest world source, the supply is running out with a continuing reduced production. The ECA is investigating possible new sources in the Congo, Ugandi, the Cameroons and Mozambique.

Copper: Although Rhodesia and the Congo among the greatest world sources, total production is needed for European recovery. Expansion is under study for both and ECA, with the aid of the Commerce Dept., has stepped up delivery of needed equipment to the Congo.

Graphite: Deals are being completed with the French for substantial quantities of Madagascar graphite out of expanding production. Investigation of the acceptability of the Austrian graphite, as well as commercial worth of Kenya and Tanganyika deposits, is under way.

Lead: Mined in a dozen ECA

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From the start you'll notice how much faster Star Blades cut metals . . . and with a truer cut, that leaves a cleaner surface. Tough, durable Star Blades lessen "time-outs" on the job, too. You see, every Star Blade is made of finest high-grade steel . . . precision-set teeth assure fast cutting and full side clearance. You'll appreciate the metal-cutting economies of Star Blades.

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countries or dependencies, total output falls below Europe's own requirements. A Tanganyika discovery is under development. A deposit has been reported in Greenland but work must await the summer thaw. ECA is financing exploration of a promising deposit in Algeria and backing expansion of production in Italy, Greece, Morocco, Austria and France.

Manganese: Best ECA source is the Gold Coast production of which the United States already receives 40 pct. An offer has been made of 200,000 tons of intermediate grade which, though not good enough for stockpiling, can be used industrially thereby allowing diversion of some higher grade for stockpiling. ECA is studying financial needs for expanding Gold Coast facilities as well as for Moroccan expansion. It is investigating deposits in both Turkey and the Congo.

Nickel: The ECA is trying to interest private investors in putting American capital in expansion plans of producers in New Caledonia and, as yet, an undeveloped deposit in Celebes. A New Caledonian production bottleneck was broken by ECA arranging shipments of coal from America.

Kyanite: Funds have been made available through Britain to an American producer in Kenya with which he can expand production sufficiently to fill stockpile with this item within three years.

Platinum, Asbestos, Vanadium: Negligible platinum production is found in ECA countries although there is an undeveloped deposit in Rhodesia. Nor are there important asbestos deposits within ECA areas. Vanadium is produced only in Rhodesia where an expansion program is under study.

Study Duty-Free Import

Washington

• • • **House Ways and** Means Committee is considering a 1-year extension of the present duty-free importation of lead. A bill (H. R. 2658), sponsored by Representative Mills, D., Ark., would continue the present suspension of the tariff from June 30, 1949, to June 30, 1950.

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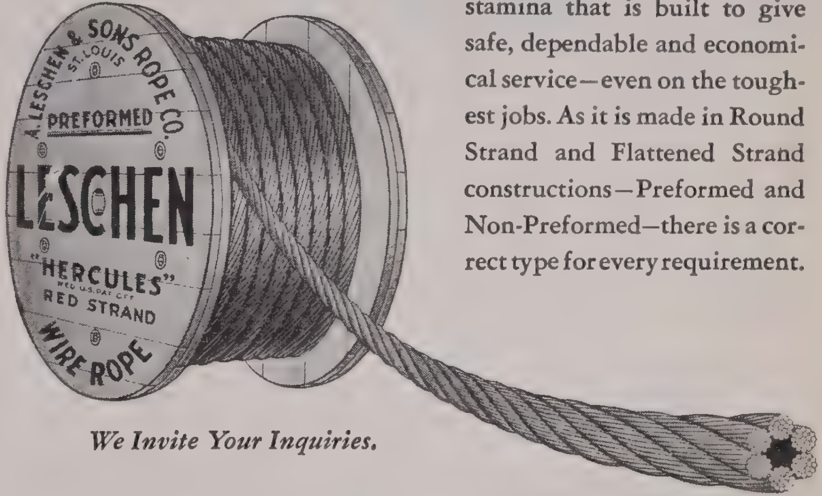
"HERCULES" (RED-STRAND) WIRE ROPE

Here is a Wire Rope with extra stamina that is built to give safe, dependable and economical service—even on the toughest jobs. As it is made in Round Strand and Flattened Strand constructions—Preformed and Non-Preformed—there is a correct type for every requirement.



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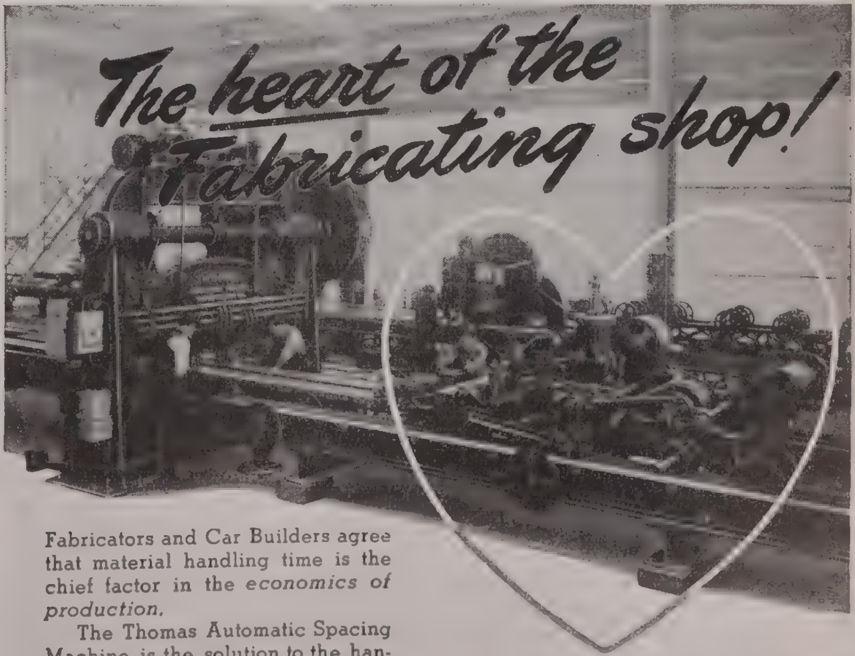

Fabricators and Car Builders agree that material handling time is the chief factor in the *economics of production.*

The Thomas Automatic Spacing Machine is the solution to the handling problem. In addition it eliminates the need for marking and assures proper spacing of rivet holes in limitless number of pieces. Thus costs are substantially reduced and production speeded.

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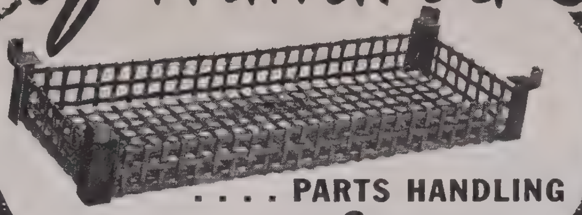

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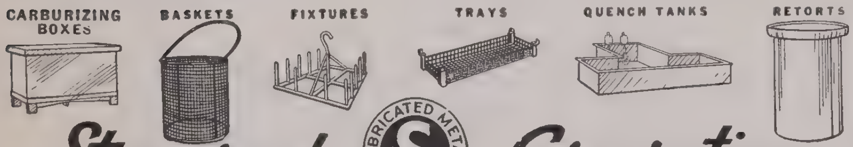

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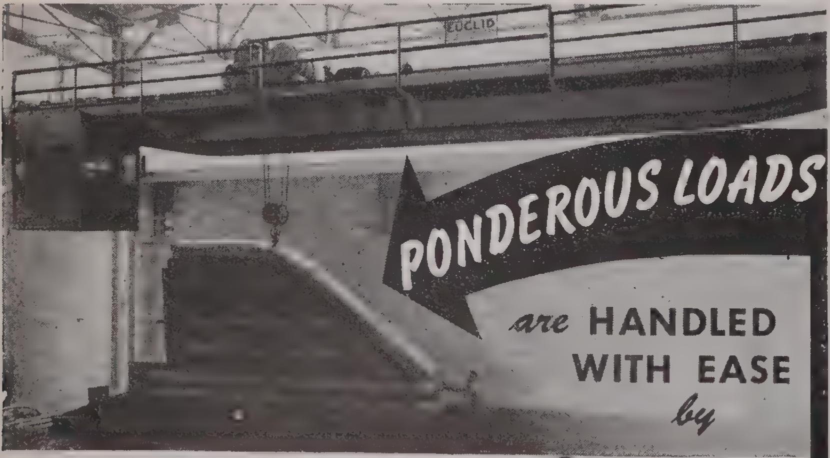

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EUCLIDS give you *power* when you want it and *strength* where you need it with ease of precision control.

An impressive number of leaders in the heavy industries successively "repeat order" on EUCLID CRANES.

Quality is built into even the smallest parts to assure years of efficient, economical service.

EUCLID CRANES are available in sizes from 1/2 to 100 tons capacity and in spans up to 100 feet.

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THE EUCLID CRANE & HOIST CO.
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Koppers Earnings Rise

Pittsburgh

• • • **Sales of Koppers Co., Inc.,** in 1948 passed the $200 million mark for the first time in its peacetime history, the company reveals in its annual report to stockholders. Net sales were $200,223,748 and additional revenue from investments and other sources brought total receipts to $200,852,859.

Net earnings for the year were $10,552,825. Margin of profit was 5.25¢ per dollar of sales.

For 1947, Koppers income from sales, services, and other sources was $162,931,072; net income was $6,165,783.

Woodward Iron Profit

Birmingham

• • • **Woodward Iron Co.'s** net profit for 1948 totaled $5,194,553, equal to $7.36 per share on 705,462 shares of capital stock outstanding. For 1947, the company reported a net of $4,308,727 or $6.11 per share.

The company's total sales during 1948 were $23,666,718, compared to $19,848,936 for 1947.

Bradford C. Colcord, Woodward president, said in releasing the company's annual report that "capital expenditures for replacements and modernization of plant and equipment amounted to $2,005,779. Work of this nature was postponed wherever possible during the war and immediately thereafter, due to material and labor shortage with the result that an accelerated program of replacement and new construction is now necessary.

Sets Quarterly Dividend

Buffalo

• • • **Frontier** Industries, Inc., has declared a quarterly dividend of 12½ cents a share on the common stock, payable Apr. 1 to stock of record March 25. A similar payment was made in the preceding quarter.

Names Regular Dividend

Buffalo

• • • **Electro Refractories & Alloys Corp.** has declared the regular quarterly dividend of 17½ cents a share on the common stock, payable Apr. 1 to holders of record March 15.

Army Plans Purchase Of $5 Million Worth Handling Equipment

Washington

• • • **Facing what** it considers a limited budget and low manpower, the Army is buckling down to a two-way attack on the problem of handling millions of tons of supplies with the smallest number of men.

If Congress approves the military budget in substantially the present form, the Army plans to purchase approximately $5 million worth of new materials handling equipment during the coming fiscal year.

Meantime, charged with maintenance as well as procurement of such items for all services, the Quartermaster Corps is proceeding with a wide-scale program of repairing and servicing equipment now in use or storage.

In addition to maintenance of equipment currently in use, the QMC shops are rebuilding and reconditioning nearly 5000 major items held by the Air Force, some of which will be set aside as part of the industrial reserve. This job will be spread out over 3 years.

The QM set-up includes three small base shops—at Belle Mead, N. J., Fort Worth, Tex., and Stockton, Calif. These are supported by 2 large base shops at Jeffersonville, Ind., and Ogden, Utah.

During 1947, activities included restoration of 2125 pieces of materials handling equipment, 7650 major assemblies, and 370 special purpose vehicles. Original value of this equipment amounted to about $8,500,000.

For the first 9 months of 1948, it is indicated, more than 3,000,000 items in the general fields of mechanical equipment, office appliances, furniture, etc., valued at about $38 million.

Typical of the QM shop work is the wav forklift trucks are handled. The Army had about 100,000 of these when the war ended—each estimated as doing the work of ten men.

Each machine is completely dismantled. Engines go to one repair department, transmissions to another, and so on. Parts are replaced or repaired as the case demands and the renovated assemblies go back for reassembly for return to use or storage.

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Get the contracts. Figure closer. But do it on the preparation end—not on the precision end. You'll find Electro HIGH SPEED GRINDING WHEELS a tremendous help in meeting both price and delivery competition. They're faster, safer, and turn out a cleaner job on any metal whether working from swing frames, floor stands or in portable machines. Learn why. Send today for our Grinding Wheel Manual 645 in full color. It's free.

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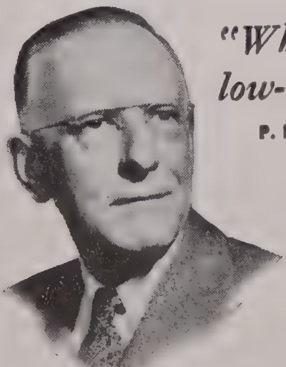


"What's so good about H-VW-M low-voltage GENERATORS?"

P. R. LYONS • District Manager • H-VW-M Cleveland Office

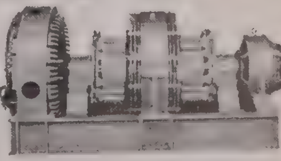
A customer fired that question at me the other day when we were talking electroplating and polishing equipment, and it was right down my alley.

"Man, take a look at these features," I replied, with all the enthusiasm first hand knowledge of H-VW-M low-voltage generator performance can arouse. "Fan action of commutator risers increases ventilation of field and rotor coils! Rolled steel ring, set in frame, lowers center of gravity! Liberal-size, sleeve type bearings assure long, quiet, trouble-free life! Moulded-in 'equaload' shunts distribute brush load equally, reduce resistance! Copper graphite brushes provide optimum commutator efficiency! Fully insulated brush holders eliminate current passage through springs and fingers! Copper pig tail bar lowers resistance of circuit.

"Add these features to H-VW-M's more than 70 years' experience with all low-voltage electrolytic applications—and I think you'll agree that H-VW-M motor generator sets are worth looking into for efficient, low cost power production," I concluded.

*** Hanson-Van Winkle-Munning** has supplied the plating industry for over 70 years. Our sales-engineers are thoroughly familiar with every step in the process of electroplating and polishing. It is this *overall* knowledge that has made H-VW-M "Headquarters" for electroplating and polishing equipment, supplies and technical assistance.

Ask your H-VW-M representative, or write "Headquarters,"* for Bulletin G-102, our new compact catalog of generator information.



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4872

Marshall Plan Aid to Tool Makers Lagging Behind Authorization

First 9 Months of Last Year Disappointing; Shipments Low As of Jan. 1

◦ ◦ ◦

• • • **Marshall Plan aid** to Europe was of little immediate benefit to the machine tool industry during its first 9 months ended Dec. 31, the latest date for which detailed figures are available.

During the period, procurement authorizations for $30 million worth of American-made machine tools were approved. The ECA has no record of actual orders placed, but as of Jan. 1, shipments reported to the agency totaled slightly more than a half million dollars' worth. These went largely to France, United Kingdom and Holland.

Great Britain was the largest potential customer, obtaining ECA approval for $10.6 million worth and France rated second with $6.6 million worth. In addition, France was authorized to buy $85,000 worth from the bizone and $58,000 from Canada with neither country reporting any shipments.

As of actual shipments from American manufacturers, reports to ECA indicated that $202,000 worth were in transit to France and $333,000 worth to Holland. Actual shipments, ECA points out, may be somewhat larger, due to the normal lag in forwarding shipping documents to the agency.

These figures add a fillip to the testimony of A. G. Bryant, chairman of the Government Relations Committee, National Machine Tool Builders' Assn., presented last week to the Senate Foreign Relations Committee in Washington.

Mr. Bryant, vice-president, Cleereman Machine Tool Co., and president, Bryant Machinery & Engineering Co., Chicago, pointed out that while a survey made last summer indicated actual orders of at least $150 million had been placed and were awaiting action by local governments in securing licenses for import and authorizations for dollars under ECA allotments, the majority of such requests were blocked.

Mr. Bryant recommended that Congress authorize ECA to direct the participating countries to include in their requests for allotments American machine tools, where such have been specified and requested by the industrial users of the respective nations.

"We were advised months ago that allotments had finally been approved covering projects in Europe and Britain which would require machine tools in a volume of approximately $115 million," Mr. Bryant declared.

"**However, instead** of these purchases being made wholly from American industry as a part of the requests of private industry in Europe for the $150 million of American machine tools, orders were to be split up so that the United States might receive by next July 1, contracts in the amount of $56 million only.

"At the same time, it was estimated that allotments under the ECA program would provide for the purchase of machine tools from Great Britain in the amount of $50 million and from other countries for the balance of the total," he added.

$150 million in orders from Great Britain and western Europe during 1948 would have represented one-fourth of the total capacity of the industry and more than 50 pct of the 1948 orders of the industry, he said.

According to Mr. Bryant, Russia is now energetically copying American makes of machine tools in increasing volume, and Great Britain is making every effort to build up its machine tool manufacture, "even at the expense of a delay in its general recovery."

He said these developments have had an effect on the United States machine tool industry which "cannot be viewed with complacency," and cited in a recent survey which indicated that it would require at least one year after any Pearl Harbor of the future for the industry, due to loss of skilled men, to attain the rate of production which the National Security Resources Board considers essential for U. S. security.

In Detroit, business activity continues at a high level so far as auto production is concerned, but new tooling programs are practically nonexistent. There are indications that one of the independent producers may soon place its tooling for a new transmission. Scattered purchases have been made recently by Dow Chemical and Saginaw Steering Gear Division, but delays have been reported on two of the more important tooling programs, namely Detroit Gear Div., Borg-Warner, and Saginaw Transmission Division. Of interest in Detroit was the announcement that Ex-Cell-O Corp. has let contracts for the construction of a new plant having 20,000 sq ft of floor space. This will be the fourth Ex-Cell-O plant in this area.

An optimistic note was the release of figures showing that December sales by members of the Resistance Welders Manufacturers Assn. showed a gain of 80 pct over the November volume—a sharp increase in the number of new orders as well as a decreased number of cancellations.

TYPE "A" ASSEMBLY BIT

COMMON SCREWDRIVER

Here's How CLUTCH HEAD *"Snowballs"*

FOR 15% TO 50% ASSEMBLY GAINS

The exclusive advantages of CLUTCH HEAD are cumulative from the start to the end of the line . . . *and beyond.* Briefly, here is how CLUTCH HEAD users highlight their assembly production gains, ranging from 15% to 50%, in comparison with the use of *other recessed head screws:*

Gain One. Higher visibility of the roomy Clutch recess substitutes confidence and speed for wavering hesitation . . . even with "green" operators.

Gain Two. Dead-center entry with the Center Pivot column prevents driver canting, makes straight driving automatic to free the lines from burred or "chewed-up" heads.

Gain Three. Non-tapered driving engagement reduces skid damage to zero by eliminating "ride-out."

Gain Four. Absence of "ride-out" cancels need for end pressure, making the drive-home almost effortless . . . disposing of a fatigue factor and end-of-the-shift lag.

Gain Five. The CLUTCH HEAD Lock-On (uniting screw and bit as a unit) hurdles "fumble-spots" by permitting one-handed reaching and driving from any angle.

Gain Six. Longer service and lower tool cost with the rugged Type "A" Bit . . . which drives up to 214,000 screws non-stop and which may be *repeatedly* reconditioned in 60 seconds.

Gain Seven. Basic recess design for operation with a common screwdriver . . . to simplify adjustments and cure field service "headaches."

Whatever the nature of your product or the special problems of your assembly line, factual testimony like this indicates that your investigation of CLUTCH HEAD'S superiorities should be worthwhile Sheet Metal, Thread-forming and Machine Screws are available in all standard sizes; also in a variety of "specials." Write for screw assortment, sample Type "A" Bit and illustrated Brochure . . . to come to you by mail

CLUTCH HEAD SCREWS

UNITED SCREW AND BOLT CORPORATION

CLEVELAND 2 CHICAGO 8 NEW YORK 7

Producers Feeling Impact of Consumers' Inventory Reductions

Zinc Market Is Latest One To Show Evidence Of Real Weakness

° ° °

New York

• • • **The impact of** inventory reductions on a nationwide scale and important setbacks to heavy metal consuming industries such as the replacement battery makers and the brass mills, have taken their toll of the metal markets.

The zinc market is the most recent to show significant signs of an easier position. Prime Western has been in short supply for some time because of heavy demand for galvanizers. The grades used by die casters and brass mills have been gradually easing for a month or more, and shipments have been falling off.

Prime Western is still selling in heavier volume than the other grades, but producers say that the pressure is off. The speculation of consumers and others in the trade revolves around the possibility of a downward price action in the immediate future. In some areas, smelters are attempting to place heavy tonnages for immediate delivery, in contrast to the heretofore limited offerings.

In aluminum primary products, sales managers are still fighting for heavier tonnages for their own products for May and June deliveries. However, there are indications of some easing in certain products. Consumers who had been unable to obtain free machining rod from recognized sources now find it being offered to them on a monthly quota.

A power plant which is to be built in eastern Pennsylvania will make use of aluminum sheet building panels as a saving over the cost of brickwork built with the current union limitation to 300 brick per bricklayer per day. Until recently, there had been no possibility of obtaining the sheet for this construction. It is understood that two primary producers are now in a position to supply the metal.

Secondary aluminum is in another position, however, producers having done a very light volume of business during the last 4 or 5 months. During that time, ingot prices have been repeatedly dropped to the point that they are now only a few cents per pound above the price of virgin ingot.

Monthly Average Prices

• • • The average prices of the major nonferrous metals in February based on quotations appearing in THE IRON AGE, were as follows:

	Cents Per Pound
Electrolytic copper, Conn. Valley	23.50
Lake copper, Conn. Valley	23.625
Straits tin, New York	$1.03
Zinc, East St. Louis	17.50
Zinc, New York	18.198
Lead, St. Louis	21.30
Lead, New York	21.50

Nonferrous Metals Prices

	Feb. 23	Feb. 24	Feb. 25	Feb. 26	Feb. 28	Mar. 1
Copper, electro, Conn.	23.50	23.50	23.56	23.50	23.50	23.50
Copper, Lake, Conn.	23.625	23.625	23.625	23.625	23.625	23.625
Tin, Straits, New York	$1.03	$1.03	$1.03	$1.03	$1.03	$1.03
Zinc, East St. Louis	17.50	17.50	17.50	17.50	17.50	17.50
Lead, St. Louis	21.30	21.30	21.30	21.30	21.30	21.30

Secondary producers believe that the inventory reduction by foundries has about reached its limit and that foundries must reenter the market for heavier tonnages soon. Last week ingot prices dropped another cent per lb.

Brass and bronze ingot producers have found themselves in a similar position. Early this week a major producer announced additional price cuts of from ½¢ to 1¢ per lb on most grades. While price drops have not been as frequent as in aluminum, the most recent drops were only 2 weeks ago.

The lead market is definitely easy and there has been a good deal of speculation on the possibility of lower prices. Producers report that 90 pct of March lead requirements has already been booked and the tonnage will be well below shipments in January and February.

These months were inflated because of the effect of the longshoremen's strikes on both coasts in deferring incoming shipments. Producers have been told by battery makers that their requirements will be heavier in March with a pick-up in business expected at that time and also that their inventories are at the minimum.

Premiums are still being paid for nearby deliveries of copper. Some export tonnage was placed last week at 24¢, but major producers took some export tonnage at 23.50¢.

The scrap markets have been disorganized by the developments in the metal markets. Scrap metals are just not moving and price reductions have been recorded in most metals week after week. Last week significant price drops occurred in copper and brass grades, aluminum and lead.

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, 10,000 lb, freight allowed	17.00
Aluminum pig	16.00
Antimony, American, Laredo, Tex.	38.50
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be	$24.50
Beryllium aluminum 5% Be, dollars per lb contained Be	$52.00
Cadmium, del'd	$2.00
Cobalt, 97-99% (per lb)	$1.65 to $1.72
Copper, electro, Conn. Valley	23.50
Copper, lake, Conn. Valley	23.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$105 to $110
Lead, St. Louis	21.30
Lead, New York	21.50
Magnesium, 99.8+%, f.o.b. Freeport, Tex.	20.50
Magnesium, sticks, carlots	34.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$86 to $88
Nickel, electro, f.o.b. New York	42.93
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$81 to $84
Silver, New York, cents per oz.	71.50
Tin, Grade A, New York	$1.03
Zinc, East St. Louis	17.50
Zinc, New York	18.198
Zirconium copper, 10-12 pct Zr, per lb contained Zr	$12.00

Remelted Metals

Brass Ingot

(Published prices, cents per lb delivered, carloads)

85-5-5-5 ingot		
No. 115	19.00*	20.00
No. 120	18.50*	19.50
No. 123	18.00*	19.00
80-10-10 ingot		
No. 305	....	25.25
No. 315	....	24.25
88-10-2 ingot		
No. 210	....	32.50
No. 215	....	29.50
No. 245	23.25*	23.75
Yellow ingot		
No. 405	16.50*	17.00
Manganese bronze		
No. 421	....	22.50

* F.o.b. Philadelphia.

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys	
0.30 copper, max.	25.75-26.50
0.60 copper, max.	25.50-26.00
Piston alloys (No. 122 type)	22.00-22.75
No. 12 alum. (No. 2 grade)	21.00-21.75
108 alloy	22.00-22.50
195 alloy	22.50-23.00
13 alloy	25.50-26.50
AXS-679	22.25-23.00

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95 pct-95½ pct	23.25-23.75
Grade 2—92 pct-95 pct	21.50-22.00
Grade 3—90 pct-92 pct	21.25-21.75
Grade 4—85 pct-90 pct	21.00-21.50

Electroplating Supplies

Anodes

(Cents per lb, freight allowed, in 500 lb lots)

Copper	
Cast, oval, 15 in. or longer	40⅛
Electrodeposited	34⅝
Rolled, oval, straight, delivered	37.34
Ball anodes	38⅝
Brass, 80-20	
Cast, oval, 15 in. or longer	35⅞
Zinc, oval, 99.99	
Ball anodes	20.50
Nickel 99 pct plus	
Cast	59.00
Rolled, depolarized	60.00
Cadmium	$2.10
Silver 999 fine, rolled, 100 oz. lots, per troy oz, f.o.b. Bridgeport, Conn.	79

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	46.00
Copper sulfate, 99.5 crystals, bbls.	9.10
Nickel salts, single or double, 100 lb bags, frt. allowed	20.00
Nickel chloride, 300 lb bbl.	24.50
Silver cyanide, 100 oz. lots, per oz.	59
Sodium cyanide, 96 pct domestic 100 lb drums	16.00
Zinc sulfate, crystals, 22.5 pct, bags	
Zinc sulfate, 25 pct, granules, bbls, frt allowed	

Mill Products

Aluminum

(Base prices, cents per pound, base 30,000 lb, f.o.b. shipping point, freight allowed)

Flat Sheet: 0.188 in., 2S, 3S, 26.9¢; 4S, 61S-O, 28.8¢; 52S, 30.9¢; 24S-O, 24S-OAL, 29.8¢; 75S-O, 75S-OAL, 36.3¢; 0.081 in., 2S, 3S, 27.9¢; 4S, 61S-O, 30.2¢; 52S, 32.3¢; 24S-O, 24S-OAL, 30.9¢; 75S-O, 75S-OAL, 38¢; 0.032 in., 2S, 3S, 29.5¢; 4S, 61S-O, 33.5¢; 52S, 36.2¢; 24S-O, 24S-OAL, 37.9¢; 75S-O, 75S-OAL, 47.6¢.

Plate: ¼ in. and heavier: 2S, 3S, F, 23.8¢; 4S-F, 26¢; 52S-F, 27.1¢; 61S-O, 26.6¢; 24S-F, 24S-FAL, 27.1¢; 75S-F, 75S-FAL, 33.9¢.

Extruded Solid Shapes: Shape factors 1 to 4, 35.1¢ to 66¢; 11 to 13, 36.1¢ to 78¢; 23 to 25, 38.2¢ to $1.07; 35 to 37, 45.7¢ to $1.65; 47 to 49, 67.5¢ to $2.41.

Rod, Rolled: 1.064 to 4.5 in., 2S-F, 3S-F, 34¢ to 30.5¢; Cold-finished, 0.375 to 3.5 in., 2S, 3S, 36.5¢ to 32¢.

Screw Machine Stock: Drawn, ⅛ to 11/32 in., 11S-T3, R317-T4, 49¢ to 38¢; cold-finished, ⅜ to 1½ in., 11S-T3, 37.5¢ to 35.5¢; ⅝ to 2 in., R317-T4, 37.5¢ to 34.5¢; rolled, 1 9/16 to 3 in., 11S-T3, 35.5¢ to 32.5¢; 2⅛ to 3⅜ in., R317-T4, 33.5¢ to 32.5¢. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in.: 2S, 36¢ to 26.5¢; 52S, 44¢ to 32¢; 56S, 47¢ to 38.5¢; 17S-T4, 50¢ to 34.5¢; 61S-T4, 44.5¢ to 34¢; 75S-T6, 76¢ to 55¢.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed Base quantity 30,000 lb)

Sheet and Plate: Ma, FSa, ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 12, 63¢-65¢; 14, 69¢-74¢; 16, 76¢-81¢; 18, 84¢-89¢; 20, 96¢-$1.01; 22, $1.22-$1.31; 24, $1.62-$1.75. Specification grade higher.

Extruded Round Rod: M, diam. in., ¼ to 0.311, 58¢; ½ to ¾, 46¢; 1¼ to 1.749, 43¢; 2½ to 5, 41¢. Other alloys higher.

Extruded Square, Hex. Bar: M, size across flats, in., ¼ to 0.311, 61¢; ½ to 0.749, 48¢; 1¼ to 1.749, 44¢; 2½ to 4, 42¢. Other alloys higher.

Extruded Solid Shapes, Rectangles: M, in weight per ft, for perimeters of less than size indicated, 0.10 to 0.11 lb. per ft, per. up to 3.5 in., 55¢; 0.22 to 0.25 lb per ft, per. up to 5.9 in., 51¢; 0.50 to 0.59 lb per ft, per. up to 8.6 in., 47¢; 1.8 to 2.59 lb per ft, per. up to 19.5 in., 44¢; 4 to 6 lb per ft, per. up to 28 in., 43¢. Other alloys higher.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.14; 5/16 to ⅜, $1.02; ½ to ⅝, 76¢; 1 to 2 in., 65¢; 0.065 to 0.082, ⅜ to 7/16, 85¢; ⅝ to ¾, 62¢; 1 to 2 in., 57¢. 0.165 to 0.219, ⅝ to ¾, 54.5¢; 1 to 2 in., 53¢; 3 to 4 in., 49¢. Other alloys higher.

Nickel and Monel

(Base prices, cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	60	47
Strip, cold-rolled	66	50
Rods and shapes		
Hot-rolled	56	45
Cold-drawn	56	45
Angles, hot-rolled	56	45
Plates	58	46
Seamless tubes	89	80
Shot and blocks	..	40

Copper, Brass, Bronze

(Cents per pound, freight prepaid on 200 lb)

	Extruded Shapes	Rods	Sheets
Copper	36.78	....	37.18
Copper, hot-rolled	....	33.03	....
Copper, drawn	....	34.28	....
Low brass	38.57*	35.35	35.66
Yellow brass	37.60*	34.28	34.59
Red brass	38.92*	35.70	36.01
Naval brass	34.90	33.65	39.59
Leaded brass	....	29.24	....
Commercial bronze	39.54*	36.57	36.88
Manganese bronze	38.49	36.99	43.09
Phosphor bronze, 5 pct	57.80*	56.30	56.05
Muntz metal	34.47	33.22	37.66
Everdur, Herculoy, Olympic, etc.	40.49	40.76	41.82
Nickel silver, 10 pct	....	47.17	44.77
Architectural bronze	33.42	....	....

* Seamless tubing.

Scrap Metals

Brass Mill Scrap

(Cents per pound; add ½¢ per lb for shipments of 20,000 lb or more)

	Heavy	Turnings
Copper	21⅛	20⅝
Yellow brass	18⅞	18⅛
Red brass	20	19¼
Commercial bronze	20⅛	19⅝
Manganese bronze	18¾	17⅞
Leaded brass rod ends	18½	

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1copper wire	19.50
No. 2 copper wire	18.50
Light copper	17.50
Refinery brass	17.25-17.50

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer)

No. 1 copper, wire	19.00
No. 2 copper, wire	18.00
Light copper	17.00
No. 1 composition	14.00-14.25
No. 1 comp. turnings	13.75-14.00
Rolled brass	12.25-12.75
Brass pipe	13.25-13.75
Radiators	12.00-12.50
Heavy yellow brass	12.00-12.25
Aluminum	
Mixed old cast	14.25-14.50
Mixed old clips	14.25-14.75
Mixed turnings, dry	13.50-13.75
Pots and pans	14.50-15.75
Low copper	17.75-18.25

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	17½—18
No. 2 heavy copper and wire	16½—17
Light copper	15½—16
Auto radiators (unsweated)	10½—11
No. 1 composition	12¾—13
No. 1 composition turnings	12½—12¾
Clean red car boxes	10¾—11
Cocks and faucets	10¾—11
Mixed heavy yellow brass	7¾— 8¼
Old rolled brass	10½—11
Brass pipe	11½—12
New soft brass clippings	15 —15½
Brass rod ends	11½—12
No. 1 brass rod turnings	8½— 9

Aluminum

Alum. pistons and struts	6½— 7
Aluminum crankcases	9 — 9½
2S aluminum clippings	14 —14½
Old sheet and utensils	9 — 9½
Borings and turnings	4½— 5
Misc. cast aluminum	9 — 9½
Dural clips (24S)	9 — 9½

Zinc

New zinc clippings	10½—11
Old zinc	9 — 9½
Zinc routings	5¼— 5¾
Old die cast scrap	5½— 6

Nickel and Monel

Pure nickel clippings	22 —23
Clean nickel turnings	17 —18
Nickel anodes	22 —23
Nickel rod ends	21 —22
New Monel clippings	16½—17½
Clean Monel turnings	11 —12
Old sheet Monel	13 —14
Old Monel castings	11 —12
Inconel clippings	13 —14
Nickel silver clippings, mixed	8 — 8½
Nickel silver turnings, mixed	7 — 7½

Lead

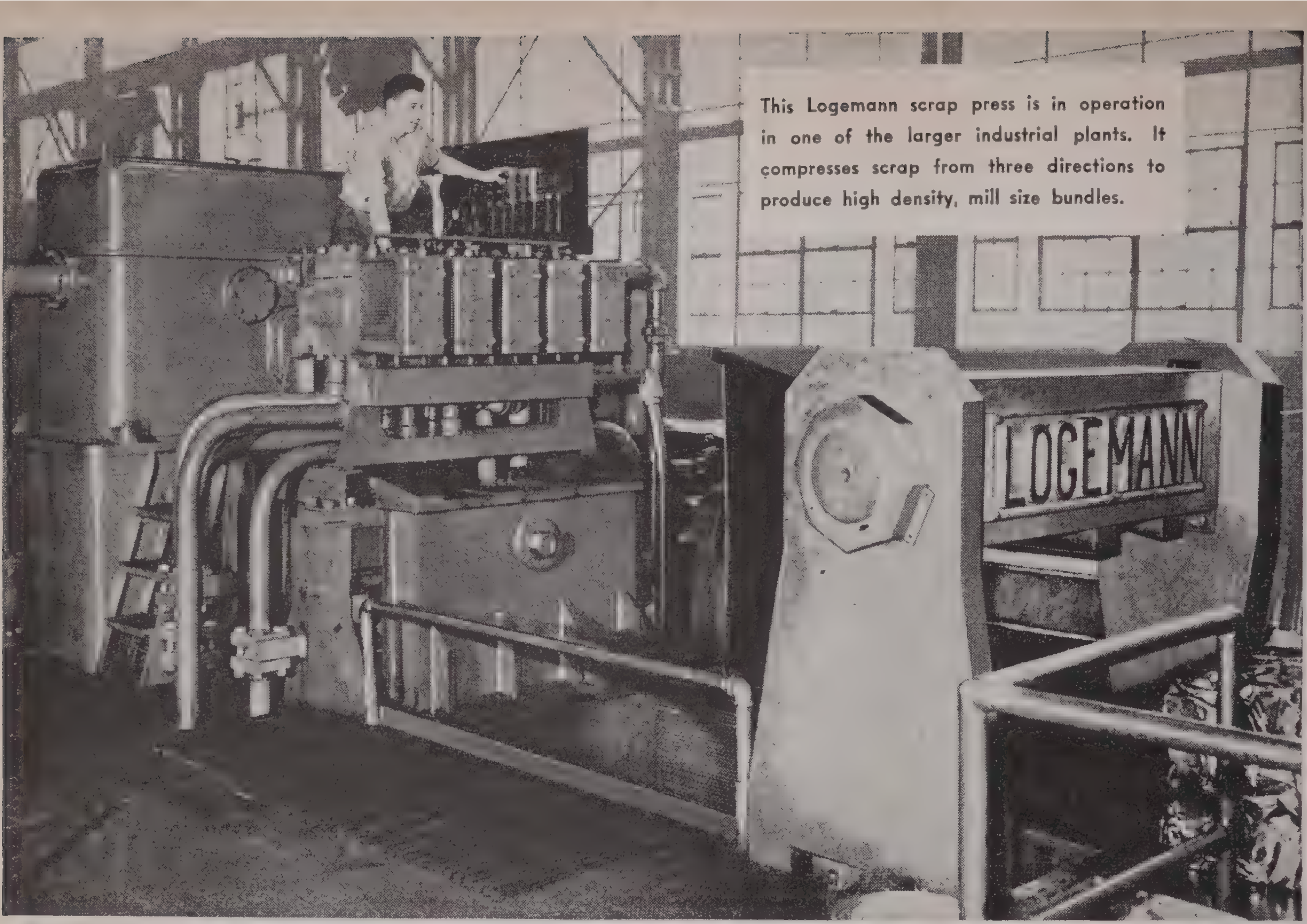
Soft scrap lead	14 —15
Battery plates (dry)	7 — 7¼

Magnesium Alloys

Segregated solids	8 — 9
Castings	4½— 5½

Miscellaneous

Block tin	82 —84
No. 1 pewter	65 —67
No. 1 auto babbitt	51 —53
Mixed common babbitt	16 —16½
Solder joints	20 —21
Siphon tops	50 —52
Small foundry type	18 —18½
Monotype	17 —17½
Lino. and stereotype	16 —16½
Electrotype	14 —14½
New type shell cuttings	15 —15½
Hand picked type shells	6 — 6½
Lino. and stereo. dross	8½— 9
Electro. dross	6 — 6½



This Logemann scrap press is in operation in one of the larger industrial plants. It compresses scrap from three directions to produce high density, mill size bundles.

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Triple Compression . .
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•

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The compact unit illustrated is completely self-contained with oil tank and pump located directly over the press . . . utilizing the advantages of short pipe lines. Automatic controls, mounted in front of pump, give the operator full visibility at all times. Controls operate rams successively within a single rigid box. There is no complex construction which means there is *no need for specially-trained maintenance crews.*

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Market Weak; Buying Slow; Stocks Good

New York

• • • **Those who had** expected the market to stabilize are frankly disappointed this week. So are those who have been predicting a flurry of new business. Neither guess has yet come true. All markets are still weak. In some areas new business is practically nonexistent. Prices are still easing off, but not as rapidly as in recent weeks.

What has some people worried most is the absence of any general pattern to characterize the market. Apparently there is little rhyme or reason to the market's refusal to find a level and stabilize on it. But the big factor in nearly all areas is the refusal of big consumers to enter the market actively. They continue to nibble a little here and there, but there is no large-scale buying.

In spite of this, stockpiles are still reported to be large. This is true of mills as well as yards. Accent is on quality in all areas. Steel companies are choosing the kind of industrial scrap which they will permit some of their customers to ship. This type of selective buying keeps rejections fairly high.

Although the market is wobbly and sales scarce, shipments on old orders are still brisk in several areas. In other areas this old business has mostly run out. Everyone expects new orders to be placed but no one will name the day.

•

PITTSBURGH—Tone of the market remains weak. Shoveling turnings were off $1 based on Detroit prices. More Detroit turnings have been offered here than local buyers will take. Good industrial No. 1 heavy melting steel has been offered by district fabricators at $39 a ton. Based on this and on current bids, railroad No. 1 steel is quotable this week at $39.50 to $40, even though the latest sales were at $42 and $44. Most of the rest of the list was weaker. So far there have been no offers to sell representative tonnages of either No. 1 or No. 2 steel at less than current quotations, but some buyers think there is now too much spread between Pittsburgh and Chicago.

CHICAGO—New orders last week were very small. Carnegie bought small tonnages of No. 2 heavy melting and No. 2 bundles at $33 and $31, respectively. Steel companies are choosing the kind of industrial scrap which they will permit some of their customers to ship. In some cases they are receiving No. 1 plates against No. 1 heavy melting orders at $35 delivered. Little activity is expected here for the next 30 days.

•

PHILADELPHIA—Mills and foundries in this area were still largely out of the market last week. But there were some sales made at lower levels. No. 2 melting was bought at $34. There was very little interest in No. 2 bundles, but one sale was reported at $32. Turnings dropped another 50¢, bringing the price to $30.50. Business in cast grades and low phos was totally lacking. Yards report that there is not much scrap coming in. But one dealer estimates that yards in eastern Pennsylvania have from 10,000 to 15,000 tons of No. 2 bundles ready for shipment. The long-continued lack of interest is the cause of the backing up of this grade in the yards.

•

CLEVELAND — Scrap shipments are good, inventories high and acceptance selective here and in the Valley, in a somewhat deceptive market. Scrap continues to move on old orders at higher prices, and mills are not canceling, taking the view that the old prices are all right for the time being as long as the quality material can be had. Current broker offerings, on the other hand, tend to depress the market further. Bundles are showing a little strength, but turnings are very weak. Foundry grades are not moving.

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DETROIT—With local mills still out of the market for March scrap, there is considerable confusion here among both local buyers and sellers of scrap. In general, the tone of the market is weak; a decrease in the price of turnings and low phos grades and a sharp dip in cast grades reflects this fact. However, the competition developing here between buyers of No. 1 bundles for openhearth and electric furnace use has pulled this item away from the heavy melting price level. The reported sale in the open market this week of 7700 tons of very choice industrial scrap reflects this condition. The price paid in the open market for some of this material is reported to be over $38. All of this material will be melted in electric furnaces, it is reported.

•

NEW YORK — For the most part brokers here are still waiting for new business to develop. During the past week movement of scrap was reported good, but nearly all of it was on old orders. Melting grades were generally weak, slipping from 50¢ to $1 a ton. Cast grades held at previous quotations, but there was no strength in this market. Hopes that the market would stabilize are still just that.

•

CINCINNATI — Small purchases by mills and broker offerings continue to make the market here. The market is weak. It shows little promise of resurgence. There is a lot of tonnage, particularly turnings, that is simply without a home. Generally, openhearth grades are weak, and with little movement of the foundry grades, the market here is almost at a standstill.

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BOSTON—The market here remains weak and drab with cast the biggest puzzle of all. All prices are only a guess until the situation turns more stable. Sales have been few and far between. The outlook in scrap is just a little brighter than it has been, but prices still tend downward with No. 1 heavy melting being quoted as $29.00.

•

BIRMINGHAM—Scrap prices in this market are shaky for all grades and the quotations listed are on the basis of substantial purchases made during the first part of February. Republic Steel Corp. and other big consumers remain out of the market and when they will return is uncertain. Trading at present is limited to spot purchases and there is mighty little of that buying.

•

ST. LOUIS—Scrap iron prices in the St. Louis industrial district declined further this week. Mills and foundries are well supplied, and business with the latter group is off. Operations are said to be on the basis of 2 and 3 days a week. More open weather has caused scrap shipments to increase.

•

BUFFALO—Bundles and No. 2 steel were fairly steady this week but the rest of the list was well sprinkled with declines of a dollar or more. No. 1 heavy melting and rail specialties slipped $1 and blast furnace grades skidded $2 to $3. The latter action was attributed to omission of turnings from the last mill orders, together with a weak Detroit market which has become a competitor in the local zone. Despite the high operating rate, mill reserves remain good, which is largely attributed to increased use of hot iron in openhearths. The ratio is said to range up to 75 pct, with consumption of purchased scrap between 10 and 15 pct of the total. As a result, rejections have risen sharply again, particularly in the case of bundles.

IRON AND STEEL SCRAP PRICES

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.50 to $39.00
RR. hvy. melting	39.50 to 40.00
No. 2 hvy. melting	36.50 to 37.00
No. 2 bundles	36.50 to 37.00
RR. scrap rails	48.00 to 49.00
Rails 2 ft and under	50.00 to 51.00
No. 1 comp'd bundles	38.50 to 39.00
Hand bdld. new shts.	38.50 to 39.00
Hvy. steel forge turn.	37.50 to 38.00
Mach, shop turn.	26.50 to 27.50
Shoveling turn.	29.00 to 30.00
Mixed bor. and turn.	26.50 to 27.50
Cast iron borings	29.00 to 30.00
No. 1 mach. cast.	48.00 to 50.00
Mixed yard cast.	39.00 to 40.00
Hvy. breakable cast.	38.00 to 39.00
Malleable	54.00 to 55.00
RR. knuck. and cup.	47.00 to 48.00
RR. coil springs	47.00 to 48.00
RR. leaf springs	47.00 to 48.00
Rolled steel wheels	47.00 to 48.00
Low phos.	44.50 to 45.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$34.00 to $35.00
No. 2 hvy. melting	31.00 to 33.00
No. 1 bundles	34.00 to 35.00
No. 2 dealers' bundles	29.00 to 31.00
Bundled mach. shop turn.	25.00 to 26.00
Galv. bundles	26.00 to 27.00
Mach. shop turn.	23.00 to 24.00
Short shov. turn.	23.00 to 24.00
Cast iron borings	23.00 to 24.00
Mix. borings and turn.	23.00 to 24.00
Low phos. hvy. forge	41.00 to 42.00
Low phos. plates	37.00 to 40.00
No. 1 RR. hvy. melt.	35.00 to 37.00
Rerolling rails	44.00 to 45.00
Miscellaneous rails	40.00 to 41.00
Angles & splice bars	40.00 to 41.00
Locomotive tires, cut	42.00 to 43.00
Cut bolster & side frames	39.00 to 40.00
Standard stl. car axles	56.00 to 58.00
No. 3 steel wheels	41.00 to 42.00
Couplers and knuckles	40.00 to 41.00
Rails, 2 ft and under	46.00 to 47.00
Malleable	40.00 to 41.00
No. 1 mach. cast.	43.00 to 44.00
No. 1 agricul. cast.	38.00 to 40.00
Heavy breakable cast	35.00 to 38.00
RR. grate bars	29.00 to 30.00
Cast iron brake shoes	30.00 to 31.00
Cast iron car wheels	38.00 to 40.00

CINCINNATI

Per gross ton, f.o.b. cars:

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	32.00 to 33.00
No. 1 bundles	32.50 to 33.00
No. 2 bundles	30.50 to 31.00
Mach. shop turn.	22.50 to 23.00
Shoveling turn.	23.50 to 24.00
Cast iron borings	23.50 to 24.00
Mixed bor. & turn.	22.50 to 23.00
Low phos. 18 in. under	37.00 to 38.00
No. 1 cupola cast.	48.00 to 50.00
Hvy. breakable cast.	36.50 to 37.50
Rails 18 in. and under	51.00 to 52.00
Rails random length	43.00 to 44.00
Drop broken	53.00 to 54.00

BOSTON

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$29.00
No. 2 hvy. melting	$25.00 to 26.00
No. 1 bundles	27.00 to 28.00
No. 2 bundles	23.00 to 24.00
Bushelings	25.00 to 26.00
Shoveling turn.	23.00
Machine shop turn.	19.00 to 20.00
Mixed bor. and turn.	19.00 to 20.00
Cl'n cast chem. bor.	28.00 to 29.00
No. 1 machinery cast.	33.50 to 34.50
No. 2 machinery cast.	30.50 to 32.50
Heavy breakable cast.	29.00 to 30.00
Stove plate	29.00 to 30.00

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	30.00 to 31.00
No. bundles	33.00 to 35.00
New busheling	32.00 to 33.00
Flashings	32.00 to 33.00
Mach. shop turn.	20.00 to 21.00
Machinery cast	38.00 to 40.00
Mixed yard cast.	36.00 to 38.00
Shoveling turn.	21.00 to 22.00
Cast iron borings	21.00 to 22.00
Mixed bor. & turn.	20.00 to 21.00
Low phos. plate	35.00 to 36.00
Heavy breakable cast.	33.00 to 35.00
Stove plate	35.00 to 36.00
Automotive cast.	38.00 to 40.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	33.00 to 34.00
No. 1 bundles	38.00 to 39.00
No. 2 bundles	31.00 to 32.00
Mach. shop turn.	30.00 to 30.50
Shoveling turn.	31.50 to 32.00
Mixed bor. and turn.	30.00 to 30.50
Clean cast chemical bor.	34.00 to 37.00
No. 1 machinery cast.	43.00 to 45.00
No. 1 mixed yard cast.	40.00 to 42.00
Hvy. breakable cast.	40.00 to 42.00
Hvy. axle forge turn.	39.00 to 40.00
Low phos. acid openhearth	41.00 to 42.00
Low, phos., electric furnace	42.00 to 43.00
Low phos. bundles	39.00 to 40.00
RR. steel wheels	45.00 to 46.00
RR. coil springs	45.00 to 46.00
RR. malleable	47.00 to 48.00
Cast iron carwheels	48.50 to 49.50

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$28.00 to $29.00
No. 2 hvy. melting	28.00 to 29.00
Bundled sheets	28.00 to 29.00
Mach. shop turn.	22.00 to 23.00
Shoveling turnings	22.00 to 23.00
Locomotive tires, uncut	39.00 to 40.00
Mis. std. sec. rails	36.00 to 38.00
Steel angle bars	40.00 to 42.00
Rails 3 ft. and under	42.00 to 43.00
RR. steel springs	41.00 to 42.00
Steel car axles	53.00 to 55.00
Brake shoes	32.00 to 33.00
Malleable	38.00 to 39.00
Cast iron car wheels	44.00 to 46.00
No. 1 machinery cast.	41.00 to 43.00
Hvy. breakable cast.	36.00 to 38.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$32.50
No. 2 hvy. melting	32.50
No. 2 bundles	31.00
No. 1 busheling	32.50
Long turnings	24.00
Shoveling turnings	26.00
Cast iron borings	26.00
Bar crops and plate	$37.00 to 37.50
Structural and plate	37.00 to 37.50
No. 1 cupola cast.	42.00 to 43.00
Stove plate	40.00 to 41.00
No. 1 RR. hvy. melt.	36.00
Steel axles	54.00 to 55.00
Scrap rails	40.00 to 41.00
Rerolling rails	50.00 to 52.00
Angles & splice bars	40.00 to 42.00
Rails 3 ft & under	40.00 to 42.00
Cast iron carwheels	48.00 to 50.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.50 to $39.00
No. 2 hvy. melting	36.50 to 37.00
No. 1 bundles	38.50 to 39.00
No. 2 bundles	35.00 to 35.50
Mach. shop turn.	27.00 to 28.00
Short shov. turn.	28.00 to 29.00
Cast iron borings	28.00 to 29.00
Low phos.	43.00 to 44.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	27.00 to 28.00
No. 2 bundles	25.00 to 28.00
Mach. shop turn.	21.50 to 22.50
Mixed bor. & turn.	21.50 to 22.50
Shoveling turnings	23.00 to 24.00
Machinery cast.	38.00 to 39.00
Mixed yard cast	35.00 to 36.00
Heavy breakable cast	33.00 to 34.00
Charging box cast	33.00 to 34.00
Unstrp. motor blks.	32.00 to 33.00
Cl'n cast chem. bor.	29.50 to 30.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.00 to $40.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 bundles	34.00 to 35.00
No. 2 bundles	31.00 to 32.00
No. 1 busheling	34.00 to 35.00
Mach. shop turn.	26.00 to 27.00
Shoveling turn.	28.00 to 29.00
Cast iron borings	26.00 to 27.00
Mixed bor. and turn.	26.00 to 27.00
Clean auto. cast	47.00 to 49.00
Mixed yard cast	38.00 to 40.00
Stove plate	38.00 to 40.00
RR. malleable	60.00 to 65.00
Small indus. malleable	37.00 to 39.00
Low phos. plate	40.50 to 41.50
Scrap rails	48.00
Rails 3 ft & under	50.00 to 52.00
RR. steel wheels	46.00 to 47.00
RR. coil & leaf spgs.	46.00 to 47.00
RR. knuckles & coup.	46.00 to 47.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$38.00 to $38.50
No. 2 hvy. melting	36.50 to 37.00
No. 1 bundles	36.50 to 37.00
No. 1 busheling	36.50 to 37.00
Drop forge flashings	36.50 to 37.00
Mach. shop turn.	23.50 to 24.00
Shoveling turn.	29.50 to 30.00
Steel axle turn.	31.00 to 31.50
Cast iron borings	29.50 to 30.00
Mixed bor. & turn.	29.50 to 30.00
Low phos. 2 ft and under	39.00 to 40.00
No. 1 machinery cast.	48.00 to 50.00
Malleable	48.00 to 50.00
RR. cast.	48.00 to 50.00
Railroad grate bars	42.00 to 43.00
Stove plate	44.00 to 46.00
RR. hvy. melting	41.00 to 41.50
Rails 3 ft and under	48.00 to 50.00
Rails 18 in. and under	49.00 to 51.00

SAN FRANCISCO

Per gross ton, f.o.b. shipping point:

No. 1 hvy. melting	$25.00
No. 2 hvy. melting	25.00
No. 1 bales	23.00
No. 2 bales	23.00
No. 3 bales	20.00
Mach. shop turn.	15.00
Elec. fur. 1 ft under	$37.50 to 40.00
No. 1 cupola cast.	38.00 to 42.00
RR. hvy. melting	26.00
Rails	26.50

LOS ANGELES

Per gross ton, f.o.b. shipping point:

No. 1 hvy. melting	$25.00
No. 2 hvy. melting	25.00
No. 1 bales	23.00
No. 2 bales	23.00
No. 3 bales	20.00
Mach. shop turn.	15.00
Elec. fur. 1 ft. under	$32.00 to 38.00
No. 1 cupola cast.	38.00 to 42.00
RR. hvy. melting	26.00

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	$27.50
Elec. fur. 1 ft. and under	36.00
No. 1 cupola cast.	$40.00 to 45.00
RR. hvy. melting	28.50

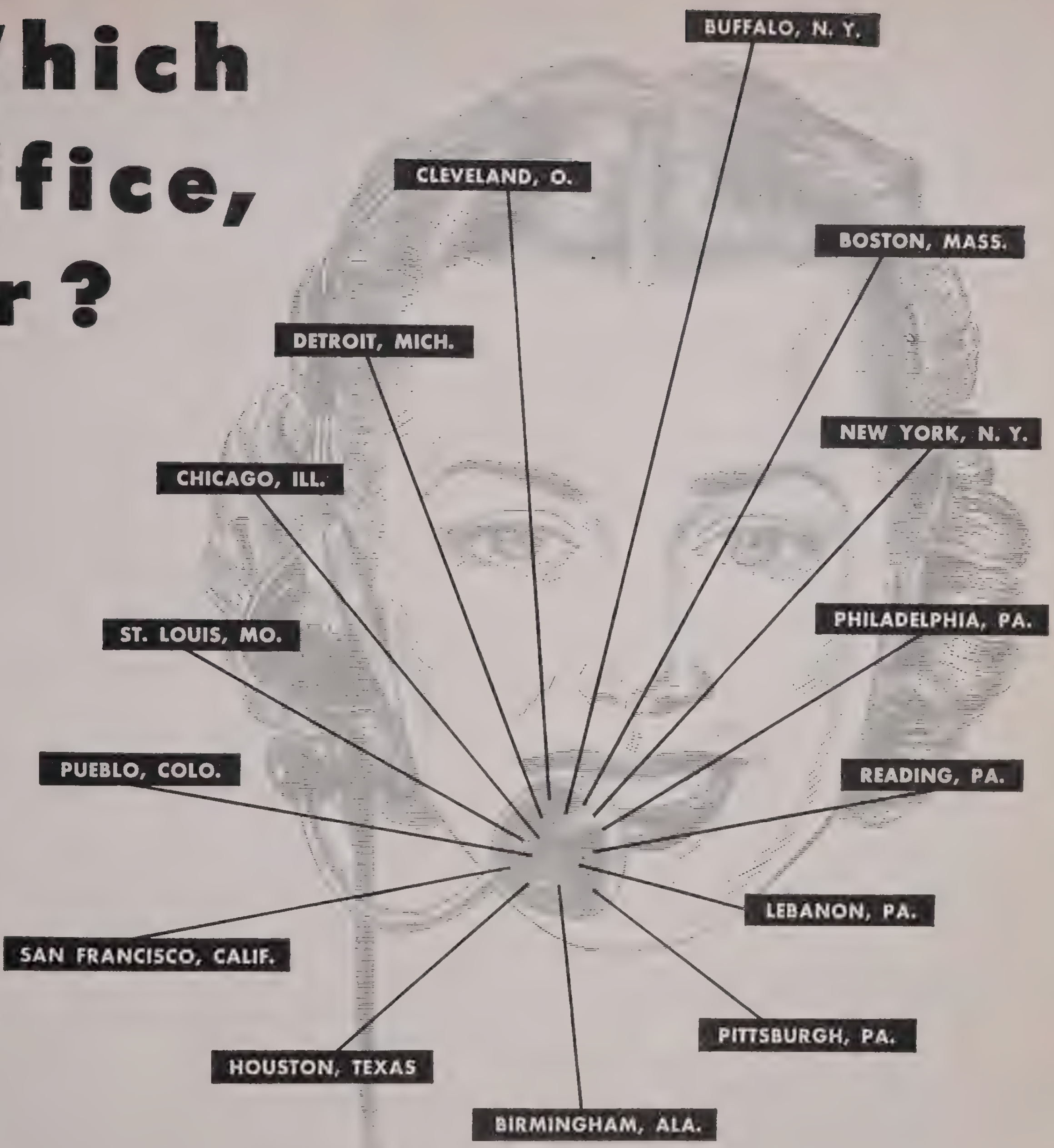
HAMILTON, ONT.

Per gross ton delivered to consumer:
Cast grades f.o.b. shipping point:

Heavy melting	$23.00*
No. 1 bundles	23.00*
No. 2 bundles	22.50*
Mechnical bundles	21.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.50*
Bushelings, new fact, prop'd	21.00*
Bushelings, new fact, unprop'd	16.00*
Short steel turnings	17.00*
No. 1 cast.	$48.00 to 50.00*
No. 2 cast.	44.00 to 45.00*

*Ceiling Price.

Which office, sir?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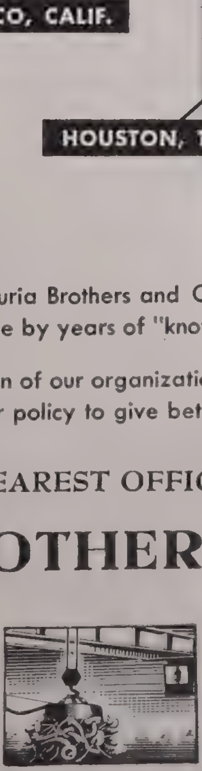

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Pacific Gas & Elec. Co., Bldg.

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Comparison of Prices . .

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

	Mar. 1, 1949	Feb. 22, 1949	Feb. 1, 1949	Mar. 2, 1948
Flat-Rolled Steel: (cents per pound)				
Hot-rolled sheets	3.26	3.26	3.26	2.80
Cold-rolled sheets	4.00	4.00	4.00	3.55
Galvanized sheets (10 ga)	4.40	4.40	4.40	3.95
Hot-rolled strip	3.265	3.265	3.265	2.80
Cold-rolled strip	4.063	4.063	4.063	3.55
Plates	3.42	3.42	3.42	2.95
Plates wrought iron	7.85	7.85	7.85	7.25
Stains C-R strip (No. 302)	33.25	33.25	33.25	30.50
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes	$7.75	$7.75	$7.75	$6.80
Tinplate, electro (0.50 lb)	6.70	6.70	6.70	6.00
Special coated mfg. ternes	6.65	6.65	6.65	5.90
Bars and Shapes: (cents per pound)				
Merchant bars	3.37	3.37	3.37	2.90
Cold-finished bars	3.995	3.995	3.995	3.55
Alloy bars	3.75	3.75	3.75	3.30
Structural shapes	3.25	3.25	3.25	2.80
Stainless bars (No. 302)	28.50	28.50	28.50	26.00
Wrought iron bars	9.50	9.50	9.50	8.65
Wire: (cents per pound)				
Bright wire	4.194	4.194	4.256	3.55
Rails: (dollars per 100 lb)				
Heavy rails	$3.20	$3.20	$3.20	$2.75
Light rails	3.55	3.55	3.55	3.10
Semifinished Steel: (dollars per net ton)				
Rerolling billets	$52.00	$52.00	$52.00	$45.00
Slabs, rerolling	52.00	52.00	52.00	45.00
Forging billets	61.00	61.00	61.00	54.00
Alloy blooms, billets, slabs	63.00	63.00	63.00	66.00
Wire rod and Skelp: (cents per pound)				
Wire rods	3.619	3.619	3.619	2.80
Skelp	3.25	3.25	3.25	2.90

	Mar. 1, 1949	Feb. 22, 1949	Feb. 1, 1949	Mar. 2, 1948
Pig Iron: (per gross ton)				
No. 2, foundry, Phila.	$51.56	$51.56	$51.56	$44.61
No. 2, Valley furnace	46.50	46.50	46.50	39.50
No. 2, Southern Cin'ti*	49.46	49.46	49.46	43.28
No. 2, Birmingham	43.38	43.38	43.38	37.38
No. 2, foundry, Chicago†	46.00	46.00	46.00	39.00
Basic del'd Philadelphia*	50.76	50.76	50.76	44.11
Basic, Valley furnace	46.00	46.00	46.00	39.00
Malleable, Chicago†	46.50	46.50	46.50	39.50
Malleable, Valley	46.50	46.50	46.50	39.50
Charcoal, Chicago	73.78	73.78	73.78	62.46
Ferromanganese‡	161.40	161.40	161.40	145.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ Average of U. S. prices quoted on Ferroalloy page.
* Does not include interim increase on total freight charges, effective Jan. 11, 1949.

	Mar. 1, 1949	Feb. 22, 1949	Feb. 1, 1949	Mar. 2, 1948
Scrap (per gross ton)				
Heavy melt'g steel, P'gh	$38.75	$38.75	$40.75	$40.25
Heavy melt'g steel, Phila.	38.50	38.50	41.50	41.00
Heavy melt'g steel, Ch'go	34.50	34.50	39.00	38.75
No. 1, hy. comp. sh't, Det.	**34.00**	33.00	33.50	35.50
Low phos. Young'n	*43.50*	45.25	45.25	45.25
No. 1, cast, Pittsburgh	*49.00*	51.50	58.50	61.00
No. 1, cast, Philadelphia	44.00	44.00	49.00	65.50
No. 1, cast, Chicago	**43.50**	42.00	51.00	66.50
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	*$14.50*	$15.25	$15.25	$12.50
Foundry coke, prompt	*16.50*	16.75	16.75	14.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	23.50	23.50	23.50	21.50
Copper, Lake Conn.	23.625	23.625	23.625	21.625
Tin, Grade A, New York	$1.03	$1.03	$1.03	94.00
Zinc, East St. Louis	17.50	17.50	17.50	12.00
Lead, St. Louis	21.30	21.30	21.30	14.80
Aluminum, virgin	17.00	17.00	17.00	15.00
Nickel, electrolytic	42.93	42.93	42.90	36.56
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	38.50	38.50	38.50	33.00

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

	FINISHED STEEL (Base Price)	PIG IRON	SCRAP STEEL
Mar. 1, 1949	3.75434¢ per lb.	$46.74 per gross ton	$37.25 per gross ton
One week ago	3.75434¢ per lb.	$46.74 per gross ton	$37.25 per gross ton
One month ago	3.75628¢ per lb.	$46.74 per gross ton	$40.42 per gross ton
One year ago	3.27585¢ per lb.	$40.37 per gross ton	$40.00 per gross ton

	HIGH	LOW
1949	3.75628¢ Jan. 1	3.75434¢ Feb. 22
1948	3.75700¢ July 27	3.22566¢ Jan. 1
1947	3.19541¢ Oct. 7	2.87118¢ Jan. 7
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1
1945	2.44104¢ Oct. 2	2.54490¢ Jan. 2
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5
1943	2.29176¢	2.29176¢
1942	2.28249¢	2.28249¢
1941	2.43078¢	2.43078¢
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16
1939	2.35367¢ Jan. 3	2.26689¢ May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2
1933	1.95578¢ Oct. 3	1.75836¢ May 2
1932	1.89196¢ July 5	1.83901¢ Mar. 1
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29
1929	2.31773¢ May 28	2.26498¢ Oct. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

HIGH	LOW
$46.82 Jan. 4	$46.74 Jan. 25
46.91 Oct. 12	39.58 Jan. 6
37.98 Dec. 30	30.14 Jan. 7
30.14 Dec. 10	25.37 Jan. 1
25.37 Oct. 23	23.61 Jan. 2
$23.61	$23.61
23.61	23.61
23.61	23.61
$23.61 Mar. 20	$23.45 Jan. 2
23.45 Dec. 23	22.61 Jan. 2
22.61 Sept. 19	20.61 Sept. 12
23.25 June 21	19.61 July 6
23.25 Mar. 9	20.25 Feb. 16
19.74 Nov. 24	18.73 Aug. 11
18.84 Nov. 5	17.83 May 14
17.90 May 1	16.90 Jan. 27
16.90 Dec. 5	13.56 Jan. 3
14.81 Jan. 5	13.56 Dec. 6
15.90 Jan. 6	14.79 Dec. 15
18.71 May 14	18.21 Dec. 17

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

HIGH	LOW
$43.00 Jan. 1	$37.25 Feb. 22
43.16 July 27	39.75 Mar. 9
42.58 Oct. 28	29.50 May 20
31.17 Dec. 24	19.17 Jan. 1
19.17 Jan. 2	18.92 May 22
19.17 Jan. 11	15.76 Oct. 24
$19.17	$19.17
19.17	19.17
$22.00 Jan. 7	$19.17 Apr. 10
21.83 Dec. 30	16.04 Apr. 9
22.50 Oct. 3	14.08 May 16
15.00 Nov. 22	11.00 June 7
21.92 Mar. 30	12.67 June 9
17.75 Dec. 21	12.67 June 8
13.42 Dec. 10	10.33 Apr. 29
13.00 Mar. 13	9.50 Sept. 25
12.25 Aug. 8	6.75 Jan. 3
8.50 Jan. 12	6.43 July 5
11.33 Jan. 6	8.50 Dec. 29
17.58 Jan. 29	14.08 Dec. 8

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

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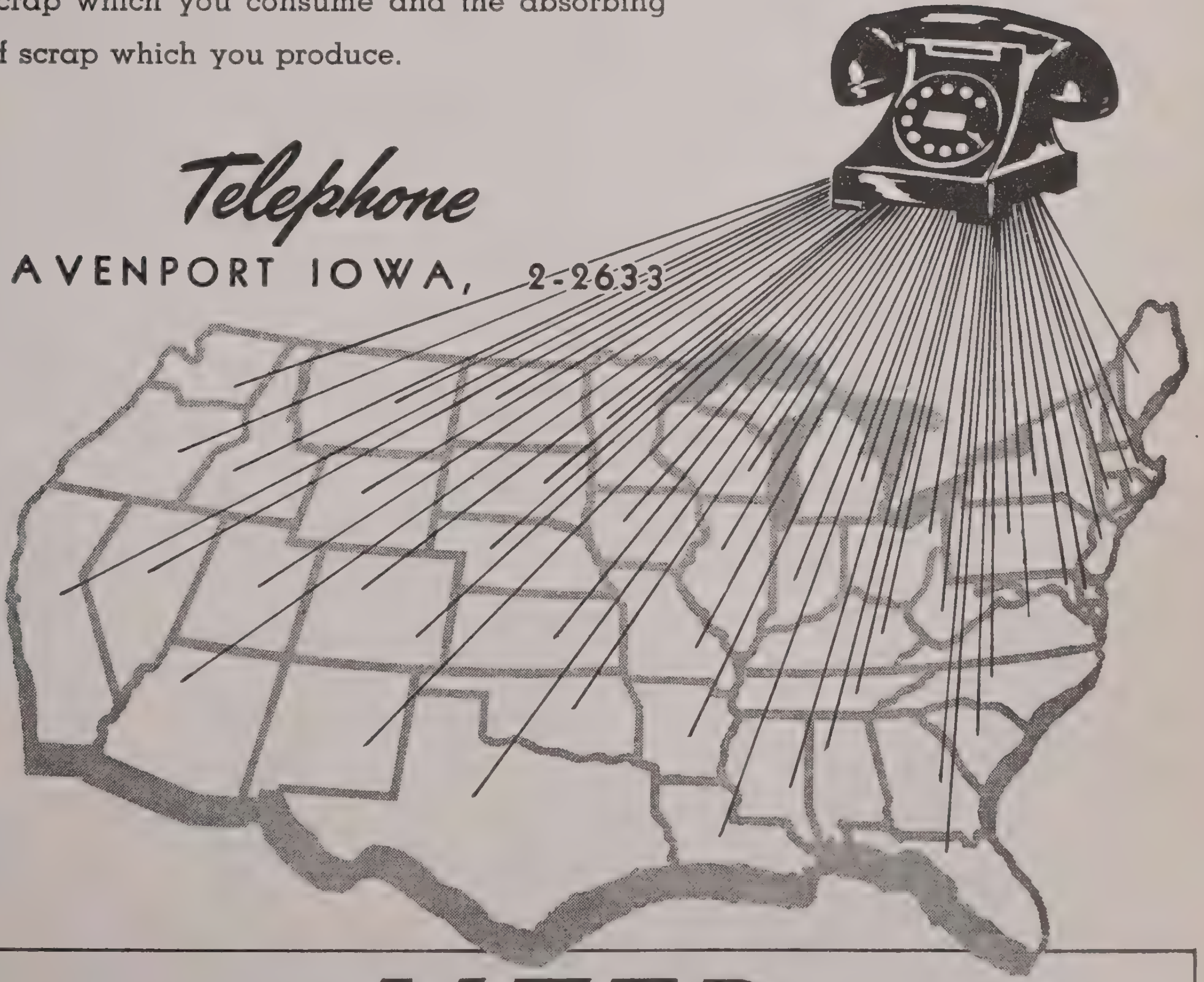

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Iron and Steel Prices . . .

Steel prices shown here are f.o.b. producing points in cents per pound unless otherwise indicated. Extras apply. (1) Commercial quality sheet grade; prices, 0.25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 25¢ per base box. (6) 18 gage and heavier. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb and over. (9) Carload lot in manufacturing trade. (10) Hollowware enameling, gages 29 to 31 only. (11) Produced to dimensional tolerances in AISI Manual Sec. 6. (12) Slab prices subject to negotiation in most cases. (13) San Francisco only. (14) Los Angeles only. (15) San Francisco and Los Angeles only. (16) Seattle only. (17) Seattle and Los Angeles only.

PRODUCTS	Base prices at producing points apply to the sizes and grades produced in these areas														
	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		Detroit	Johnstown	Seattle, S. Frisco, LosAngeles	Fontana
INGOTS Carbon forging	$50.00														
Alloy	$51.00						(per net ton)								
BILLETS, BLOOMS, SLABS Carbon, rerolling[12]	$52.00				$52.00	$52.00	(per net ton)						$52.00		
Carbon forging billets	$61.00	$61.00	$61.00	$61.00	$61.00	$61.00	(per net ton)						$61.00		
Alloy	$63.00	$63.00				$63.00	(Bethlehem, Canton, Massillon = $63.00) (per net ton)								
PIPE SKELP	3.25						3.25				Warren =3.25				
WIRE RODS	3.40 to 4.15	3.40 to 3.90		3.40	3.40		3.65	3.50			Worcester 3.70		3.40	4.05[13] 4.10[14]	
SHEETS Hot-rolled[6]	3.25 to 3.30	3.25	3.25	3.25–3.30	3.25	3.25	3.25	3.25		Warren, Ashland =3.25		3.45		3.95[15]	5.65
Cold-rolled[1]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.70	4.00	Warren 4.00	4.20		Pittsburg, Cal. 4.95	
Galvanized (10 gage)	4.40	4.40	4.40		4.40			4.40	Canton =4.40	4.40	Ashland =4.40			5.15[15]	
Enameling (12 gage)	4.40	4.40	4.40	4.40			4.40		4.60	4.40		4.70			
Long ternes[2] (10 gage)	4.80		4.80							4.80					
STRIP Hot-rolled[3]	3.25 to 3.30	3.25 to 3.30	3.25	3.25 to 3.30	3.25	3.25	3.25	3.25		3.25	Warren =3.25	3.45		4.00 to 4.25	5.90
Cold-rolled[4]	4.00	4.25		4.00		4.00	4.00	4.00		New Haven 4.50 Warren=4.00 to 4.25		4.20 to 4.50			7.10
TINPLATE Cokes, 1.50 lb.[5] base box	$7.75	$7.75	$7.75		$7.85			$7.85	$7.95	Warren, Ohio =$7.75				Pittsburg, Cal.=$8.50	
Electrolytic 0.25, 0.50, 0.75 lb. box	Deduct $1.30, $1.05 and 75¢ respectively from 1.50 lb. coke base box price														
TERNES MFG., special coated	Deduct $1.10 from 1.50 lb. coke base box price														
BLACKPLATE CANMAKING 55 to 128 lb.	Deduct $2.00 from 1.50 lb. coke base box price														
BLACKPLATE, h.e., 29 ga.[10]	5.30	5.30	5.30					5.40		Warren, Ohio =5.30					
BARS Carbon Steel	3.35 to 3.55	3.35	3.35	3.35	3.35	3.35	3.35	3.35		3.35	Canton =3.35	3.55	3.35	4.05 to 4.10	5.30
Reinforcing (billet)[7]	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35			Canton =3.35		3.35	4.05 to 4.10	5.30
Cold-finished[8]	3.95 to 4.00	4.00	4.00	4.00		4.00	4.00					4.30			
Alloy, hot-rolled	3.75	3.75	3.75			3.75	3.75	Bethlehem, Canton, Massillon=3.75				4.05	3.75	4.80[14]	5.50
Alloy cold-drawn	4.65 to 4.75	4.65	4.65	4.65		4.65	4.65	Massillon=4.65			Worcester 4.95				
PLATE Carbon steel[11]	3.40 to 3.60	3.40	3.40	3.40 to 3.60	3.40 Cons	3.45 hohocken	3.40 =3.95	3.45 Coatesville=3.75, Claymont=3.95 Geneva=3.40, Harrisburg=6.50				3.65	3.45	4.30[16]	5.80
Floor plates	4.55	4.55		4.55				Conshohocken =4.55							
Alloy	4.40	4.40							Coatesville=5.10						
SHAPES, Structural	3.25 to 3.30	3.25	3.25		3.25	3.30	Bethlehem=3.30, Geneva, Utah=3.25						3.30	3.85 to 4.30	5.75
MANUFACTURERS' WIRE[9] Bright	4.15 to 4.50	4.15		4.15	4.15		4.15	4.25	Duluth=4.15, Worcester=4.45				4.15	5.15[13]	
Spring (high carbon)	5.20	5.20		5.20				5.30	Worcester=5.50 New Haven, Trenton=5.50				5.20	Duluth= 5.2[illegible]-6.15	
PILING, Steel sheet	4.05	4.05				4.05									

STAINLESS STEELS

Base prices, in cents per pound, f.o.b. producing point

Product	Chromium Nickel						Straight Chromium		
	301	302	303	304	316	347	410	416	430
Ingots, rerolling	12.75	13.50	15.00	15.50	22.75	20.00	11.25	13.75	11.50
Slabs, billets, rerolling	17.00	18.25	20.25	19.25	30.25	26.75	15.00	18.50	15.25
Forging discs, die blocks, rings	30.50	30.50	33.00	32.00	49.00	41.00	24.50	25.00	25.00
Billets, forging	24.25-26.50	24.25-26.50	26.25-28.75	25.50-27.75	39.00-42.75	32.75-35.75	19.50-21.50	20.00-21.75	20.00-21.75
Bars, wire, structurals	28.50	28.50	31.00	30.00	46.00	38.50	23.00	23.50	23.50
Plates	32.00	32.00	34.00	34.00	50.50	44.00	26.00	26.50	26 50
Sheets	37.50-40.75	37.50-40.75	39.50-43.00	39.50-43.00	53.00-57.25	50.00-54.00	33.00	33.50	35.50
Strip, hot-rolled	24.25	25.75	30.00	27.75	46.00	38.75	21.25	28.00	21.75
Strip, cold-rolled	30.50-30.75	33.00-33.50	36.50-39.50	35.00-35.75	55.00-57.25	48.50-50.00	27.00	33.50	27.50

ELECTRODES

Cents per lb. f.o.b. plant, threaded electrodes with nipples, unboxed

Diameter in in.	Length in in.	
Graphite		
17, 18, 20	60, 72	16.00¢
8 to 16	48, 60, 72	16.50¢
7	48, 60	17.75¢
6	48, 60	19.00¢
4, 5	40	19.50¢
3	40	20.50¢
2½	24, 30	21.00¢
2	24, 30	23.00¢
Carbon		
40	100, 110	7.50¢
35	65, 110	7.50¢
30	65, 84, 110	7.50¢
24	72 to 104	7.50¢
17 to 20	84, 90	7.50¢
14	60, 72	8.00¢
10, 12	60	8.25¢
8	60	8.50¢

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	90.5¢
18	4	1	—	5	$1.42
18	4	2	—	—	$1.025
1.5	4	1.5	8	—	65¢
6	4	2	6	—	69.5¢
High-carbon-chromium					52¢
Oil hardened manganese					29¢
Special carbon					26.5¢
Extra carbon					22¢
Regular carbon					19¢

Warehouse prices on and east of Mississippi are 2½¢ per lb higher. West of Mississippi, 4½¢ higher.

ELECTRICAL SHEETS

24 gage, HR cut lengths, f.o.b. mill

	Cents per lb
Armature	5.45 to 6.05
Electrical	5.95 to 6.55
Motor	6.70 to 6.95
Dynamo	7.50 to 7.75
Transformer 72	8.05 to 10.05
Transformer 65	8.60 to 10.60
Transformer 58	9.30 to 11.30
Transformer 52	10.10 to 11.35

RAILS, TRACK SUPPLIES

F.o.b. mill

Standard rails, 100 lb and heavier, No. 1 quality, per 100 lb	$3.20†
Joint bars, 100 lb	4.25
Light rails (from billets) per 100 lb	3.55

	Base Price cents per lb
Track spikes	5.35
Axles	5.20
Screw spikes	8.00
Tie plates	4.05
Tie plates, Pittsburgh, Calif.*	4.20
Track bolts, untreated	8.25
Track bolts, heat treated, to railroads	8.50

*Seattle, add 30¢.

†CF&I and Inland, $3.50.

C-R SPRING STEEL

Base per pound f.o.b. mill

0.26 to 0.40 carbon	4.00¢
0.41 to 0.60 carbon	5.50¢
0.61 to 0.80 carbon	6.10¢
0.81 to 1.05 carbon	8.05¢
1.06 to 1.35 carbon	10.35¢

Worcester, add 0.30¢.

CLAD STEEL

Base prices, cents per pound

Stainless clad	Plate	Sheet
No. 304, 20 pct, f.o.b.		
Coatesville, Pa.	*26.50	
Washington, Pa.	*26.50	*22.50
Claymont, Del.	*26.50	
Conshohocken, Pa.		*22.50
Nickel-clad		
10 pct f.o.b. Coatesville, Pa.	27.50	
Inconel-clad		
10 pct, f.o.b. Coatesville.	36.00	
Monel-clad		
10 pct, f.o.b. Coatesville.	29.00	
Aluminized steel sheets		
Hot dip, 20 gage, f.o.b. Butler, Pa.		9.25

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* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. mill

	Base Column	*Pittsburg, Calif.*
Standard & coated nails*	103	123
Galvanized nails*	103	123
Woven wire fence†	109	132
Fence posts, carloads††	114	...
Single loop bale ties	106	130
Galvanized barbed wire**	123	143
Twisted barbless wire	123	...

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* Pgh., Chi., Duluth; Worcester, 6 columns higher. † 15½ gage and heavier. ** On 80 rod spools, in carloads. †† Duluth only.

	Base per 100 lb	*Pittsburg, Calif.*
Annealed fence wire‡	$4.80	$5.75
Annealed, galv. fencing‡	5.25	6.20
Cut nails, carloads‡‡	6.75	...

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‡ Add 30¢ at Worcester: 10¢ at Sparrows Pt.

‡‡ Less 20¢ to jobbers.

HIGH STRENGTH, LOW ALLOY STEELS

Mill base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dyn-alloy	HI Steel	Mayari R	Otis-coloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	5.20	5.20	5.20	5.30	5.20	5.30	5.20	5.40	5.65
Sheets									
Hot-rolled	4.95	4.95	4.95	5.25	4.95	4.95	4.95	5.15	5.25
Cold-rolled	6.05	6.05	6.05	.....	6.05	6.05	6.05	6.25	6.35
Galvanized	.....	6.75	.. ..	.....	.....	6.75	.....	.....	.....
Strip									
Hot-rolled	4.95	4.95	4.95	.....	4.95	4.95	4.95	5.15	5.25
Cold-rolled	.....	.....	6.05	.....	.....	6.05	6.05	.....	6.35
Shapes	.. ..	4.95	.....	.....	4.95	5.05	4.95	.....	.....
Beams	.....	4.95	.....	.....	.....	.....	.....	.....	.....
Bars									
Hot-rolled	5.10	5.10	5.10	.....	5.10	5.10	5.10	.....	5.40
Bar shapes	.....	5.10	.....	.....	5.10	5.10	5.10	.....	.....

PIPE AND TUBING

Base discounts, f.o.b. mills,
Base price, $200.00 per net ton.

STANDARD, THREADED AND COUPLED

Steel, buttweld	*Black*	*Galv.*
½-in.	43 to 41	20 to 18
¾-in.	46 to 44	24 to 22
1-in.	48½ to 46½	27 to 25
1¼-in.	49 to 47	27½ to 25½
1½-in.	49½ to 47½	28 to 26
2-in.	50 to 48	28½ to 26½
2½ to 3-in.	50½ to 49½	29 to 27
Steel, lapweld		
2-in.	39½	17½
2½ to 3-in.	39½	21½
3½ to 6-in.	46½ to 42	20½ to 24½
Steel, seamless		
2-in.	38½ to 27	16½ to 5
2½ to 3-in.	41½ to 35	19½ to 10½
3½ to 6-in.	43½ to 38½	21½ to 16½
Wrought Iron, buttweld		
½-in.	+20½	+52½
¾-in.	+10½	+41½
1 & 1¼-in.	+ 4½	+32½
2-in.	— 1½	+29
3-in.	— 2	+28½
Wrought Iron, lapweld		
2-in.	+ 7½	+36½
2½ to 3½-in.	+ 5	+32
4-in.	list	+26
4½ to 8-in.	+ 2	+27½

EXTRA STRONG, PLAIN ENDS

Steel, buttweld		
½-in.	42 to 40	20½ to 18½
¾-in.	46 to 44	24½ to 22½
1-in.	48 to 46	27½ to 25½
1¼-in.	48½ to 46½	28 to 26
1½-in.	49 to 47	28½ to 26½
2-in.	49½ to 47½	29 to 27
2½ to 3-in.	50 to 48	29½ to 27½
Steel, lapweld		
2-in.	39½	18½
2½ to 3-in.	44½	23½
3½ to 6-in.	48 to 44	23 to 27
Steel, seamless		
2-in.	37½ to 32½	16½ to 11½
2½ to 3-in.	41½ to 36½	20½ to 15½
3½ to 6-in.	45	24
Wrought Iron, buttweld		
½-in.	+16	+46½
¾-in.	+ 9½	+39½
1 to 2-in.	— 1½	+28½
Wrought Iron, lapweld		
2-in.	+ 4½	+33
2½ to 4-in.	— 5	+21½
4½ to 6-in.	— 1	+26

For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Prices per 100 ft at mill in carload lots, cut length 4 to 24 ft inclusive.

OD	Gage	Seamless		Electric Weld	
in in.	BWG	H.R.	C.R.	H.R.	C.D.
2	13	19.18	22.56	18.60	21.89
2½	12	25.79	30.33	25.02	29.41
3	12	28.68	33.76	27.82	32.74
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78

CAST IRON WATER PIPE

	Per net ton
6 to 24-in., del'd Chicago	$106.70
6 to 24-in., del'd N. Y.	103.50 to 108.40
6 to 24-in., Birmingham	93.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less	120.30

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. mill Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

	Pct Off List
½ in. & smaller x 6 in. & shorter	35
9/16 & ⅝ in. x 6 in. & shorter	37
¾ in. & larger x 6 in. & shorter	34
All diam, longer than 6 in.	30
Lag, all diam over 6 in. longer	35
Lag, all diam x 6 in. & shorter	37
Plow bolts	47

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	35
9/16 to 1 in. inclusive	34
1⅛ to 1½ in. inclusive	32
1⅝ in. and larger	27

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifinished Hexagon Nuts

	USS	SAE
7/16 in. and smaller	..	41
½ in. and smaller	38	..
½ in. through 1 in.	..	39
9/16 in. through 1 in.	37	..
1⅛ in. through 1½ in.	35	37
1⅝ in. and larger	28	..

In full case lots, 15 pct additional discount.

Stove Bolts

Packages, nuts separate	$61.75
In bulk	70.00

Large Rivets

	(½ in. and larger) *Base per 100 lb*
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$6.75
F.o.b. Lebanon, Pa.	6.75

Small Rivets

	(7/16 in. and smaller) *Pct off List*
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	48

Cap and Set Screws

(In packages)	*Pct Off List*
Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	46
¾ to 1 in. x 6 in., SAE (1035), heat treated	35
Milled studs	19
Flat head cap screws, listed sizes	5
Fillister head cap, listed sizes	28

FLUORSPAR

Washed gravel fluorspar, f.o.b. cars, Rosiclare, Ill.

Effective CaF, Content:	*Base price per net ton*
70% or more	$37.00
60% or less	34.00

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports*)

	Per Gross Ton
Old range, bessemer	$7.60
Old range, nonbessemer	7.45
Mesabi, bessemer	7.35
Mesabi, nonbessemer	7.20
High phosphorus	7.20

After Dec. 31, 1948, increases or decreases in Upper Lake freight, dock and handling charges and taxes thereon to be for the buyers' account.

METAL POWDERS

Per pound, f.o.b. shipping point, in to lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags	7.9¢ to 9.0
Domestic sponge iron, 98+% Fe, carload lots	9.0¢ to 15.0
Electrolytic iron, annealed, 99.5+% Fe	31.5¢ to 39.5
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe	48.5
Hydrogen reduced iron, minus 300 mesh, 98+% Fe	63.0¢ to 80.0
Carbonyl iron, size 5 to 10 microns, 98%, 99.8%+ Fe	90.0¢ to $1.7
Aluminum	31.00
Antimony	51.17
Brass, 10 ton lots	27.25 to 37.25
Copper, electrolytic	33.625
Copper, reduced	34.25
Cadmium	$2.4
Chromium, electrolytic, 99% min.	$3.5
Lead	28.00
Manganese	60.00
Molybdenum, 99%	$2.6
Nickel, unannealed	67.00
Nickel, spherical, minus 30 mesh, unannealed	68.00
Silicon	34.00
Solder powder	8.5¢ plus metal cos
Stainless steel, 302	75.0
Tin	$1.15
Tungsten, 99%	$2.9
Zinc, 10 ton lots	17.75 to 22.25

COKE

Furnace, beehive (f.o.b. oven)	Net To
Connellsville, Pa.	$14.00 to $15.0
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	$16.00 to $17.0
Foundry, Byproduct	
Buffalo, del'd	$22.9
Chicago, f.o.b.	20.4
Detroit, f.o.b.	19.4
New England, del'd	23.3
Seaboard, N. J., f.o.b.	21.5
Philadelphia, f.o.b.	21.0
Swedeland, Pa., f.o.b.	21.0
Painesville, Ohio, f.o.b.	20.9
Erie, del'd	$21.50 to 23.5
Cleveland, del'd	22.4
Cincinnati, del'd	21.5
St. Paul, f.o.b.	23.5
St. Louis, del'd	20.9
Birmingham, del'd	18.6

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Carloads, Per 100
First quality, Pa., Md., Ky., Mo., Ill. (except Salina, Pa., add $5)	$80.0
No. 1 Ohio	74.0
Sec. quality, Pa., Md., Ky., Mo., Ill.	74.0
No. 2 Ohio	66.0
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	11.5

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$80.0
Childs, Pa.	84.0
Hays, Pa.	85.0
Chicago District	89.0
Western, Utah and Calif.	95.0
Super Duty, Hays, Pa., Athens, Tex.	85.0
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	$13.75 to 14.0
Silica cement, net ton, bulk, Hays, Pa.	16.0
Silica cement, net ton, bulk, Ensley, Ala.	15.0
Silica cement, net ton, bulk, Chicago District	14.7
Silica cement, net ton, bulk, Utah and Calif.	21.0

Chrome Brick

	Per Net To
Standard chemically bonded, Balt., Chester	$69.0

Magnesite Brick

Standard, Balt. and Chester	$91.0
Chemically bonded, Balt. and Chester	80.0

Grain Magnesite

	Std. ⅜-in. grains
Domestic, f.o.b. Balt. and Chester, in bulk, fines removed	$56.5
Domestic, f.o.b. Chewelah, Wash., in bulk with fines	$30.50 to 31.0
in sacks with fines	35.00 to 35.5

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk. Midwest, add 10¢; Missouri Valley, add 20¢	$12.2

WAREHOUSE PRICES

Base prices, f.o.b. warehouse, dollars per 100 lb.
(Metropolitan area delivery, add 15¢ to base price except Cincinnati and New Orleans (*), add 10¢; New York, add 20¢.)

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Baltimore	5.31	6.21-6.41	6.95-7.11	5.37	....	5.56	5.36	5.42	6.16	....	10.10	....	....
Birmingham	5.05	....	6.45	5.05	6.68	5.25	5.00	5.00	6.68	....	....	....	....
Boston	5.55	6.45-6.75	7.71-7.85	5.65-5.95	6.75	5.80	5.42	5.52	6.27	9.64-9.82	10.04-10.07	11.23-11.27	11.47-11.52
Buffalo	4.85	5.00-5.75	7.26-7.70	5.29-5.65	6.35-7.27	5.35	5.10	5.05-5.15	5.80	9.70-9.73	9.95-9.98	11.15-11.18	11.40-11.43
Chicago	4.85	5.75	7.10	4.85	6.68	5.10	4.90	4.90	5.70	9.35-9.50	9.60-9.75	10.80-10.90	11.05-11.15
Cincinnati	5.16-5.28*	6.13*-6.18	7.53	5.28*-5.55	....	5.53*-5.63	5.40*-5.48	5.33*-5.55	6.09*-6.10	9.74	9.99	11.19	11.44
Cleveland	4.98-5.16	5.75-6.06	7.20-7.46	5.03-5.15	....	5.37-5.54	5.16-5.47	5.17-5.34	5.90-5.97	9.49-9.66	9.74-9.91	10.95-11.07	11.19-11.32
Detroit	5.28-5.32	6.07-6.18	7.53-7.58	5.28-5.47	6.27-6.58	5.53-5.57	5.40	5.33-5.55	6.01-6.10	9.69-9.82	9.94-10.07	11.11-11.14	11.35-11.39
Follansbee	4.85	5.75	7.15	....	6.00	....	....	....	....	....	....	....	....
Houston	6.50-6.70	....	8.50	7.00	....	6.70	6.55	6.65	7.60	10.30	10.25	11.45	11.70
Indianapolis	5.15	6.05	7.39	5.15	6.25	5.40	5.20	5.35	6.50	....	....	....	....
Los Angeles	6.45-6.60	7.90-8.05	8.75-8.90	6.65-6.80	9.35[5]	6.15-7.60	5.95-6.10	6.10-6.25	7.95-9.35	10.90-11.60	10.85-11.55	12.40-12.95	12.65-13.20
Memphis	5.75	6.60	....	5.95	6.80	5.95	5.75	5.75	6.50	....	....	....	....
Milwaukee	5.03	5.93	7.28	5.38	6.86	5.28	5.08	5.08	5.87-5.88	9.53	9.78	10.98	11.23
New Orleans	5.95*	6.75*	....	6.15*	....	6.15*	5.95*	5.95*	6.65*	....	....	....	....
New York	5.40-5.51	6.46	7.71-7.86	5.62-5.72	....	5.70-5.81	5.33-5.61	5.57-5.60	6.41	9.73-9.91	9.98-10.16	11.18	11.43
Norfolk	5.80	....	....	6.05	....	6.05	6.05	6.05	7.05	....	....	....	....
Omaha	5.92	....	9.18	5.92	....	6.17	5.97	5.97	6.77	....	....	....	....
Philadelphia	5.15-5.44	6.36-6.79	7.33-7.43	5.35-5.45	6.74	5.38	5.10	5.40-5.45	6.19	9.50	9.75-10.34	10.95	11.20
Pittsburgh	4.85-4.90	5.75[1]	7.15-7.70	5.10	6.00	5.20-5.25	4.95-5.15	5.00-5.10	5.65	9.35	9.60	10.40	11.30
Portland	6.60[4]	8.00[2]	9.20[2]-9.20[3]	6.85[4]	....	6.30[4]	6.25[4]	6.25[4]	8.25[4]	....	10.45[15]	....	12.05[15]
Salt Lake City	7.05-8.00	8.20	7.90-9.06	7.10-7.70	....	5.75-6.85	6.65-7.00	6.95-7.25	7.40 7.55-	....	....	....	....
San Francisco	5.95-6.00	7.15-7.85	8.25-8.70	6.75	....	7.60	5.90	5.90	7.55	10.90	10.85	10.40	12.65
Seattle	6.20[4]-7.10[4]	7.75[2]-8.65[2]	7.65 9.15[2]	6.55[4]-6.70[4]	....	6.20-6.35[4]	6.15-6.30[4]	6.05[4]-6.20[4]	8.00[14]-8.15[14]	....	10.30[15]-11.35[15]	....	12.00[15]-14.10[15]
St. Louis	5.21-5.37	6.12-6.27	7.47-7.52	5.22-5.97	8.68	5.47-5.62	5.27-5.42	5.27-5.92	6.07-6.22	9.72	9.97	....	11.42
St. Paul	5.44	6.19-6.34	7.74	5.44	6.82	5.64-6.69	5.49	5.49	6.29	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED:

Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED:

Sheets, 400 to 1999 lb; strip, extras on all quantities bars 1000 lb and over.

ALLOY BARS:

1000 to 1999 lb.

GALVANIZED SHEETS:

450 to 1499 lb.

EXCEPTIONS:

(1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb; (18) 1000 to 1499 lb.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight nor the 6 pct increase on total freight charges in the Eastern Zone (5 pct Southern Zone, 4 pct Western Zone), effective Jan. 11, 1949.

PRODUCING POINT PRICES

Producing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	48.00	.....	.....	.....	.....
Birmingham	42.88	43.38	.....	.....	.....
Buffalo	47.00	47.00	47.50	.....	.....
Chicago	46.00	46.00	46.50	47.00	.....
Cleveland	46.00	46.50	46.50	47.00	51.00
Duluth	46.00	46.50	46.50	47.00	.....
Erie	46.00	46.50	46.50	47.00	.....
Everett	.....	52.75	53.25	.....	.....
Granite City	47.90	48.40	48.90	.....	.....
Ironton, Utah	46.00-55.00	46.50-55.50	.....	.....	.....
Lone Star, Texas	50.00	50.50†	.....	.....	.....
Neville Island	46.00	46.50	46.50	.....	.....
Geneva, Utah	46.00	46.50	.....	.....	.....
Sharpsville	46.00	46.50	46.50	47.00	.....
Steelton	48.00	48.50	49.00	49.50	54.00
Struthers, Ohio	46.00	.....	.....	.....	.....
Swedeland	50.00	50.50	51.00	51.50	.....
Toledo	46.00	46.50	46.50	47.00	.....
Troy, N. Y.	.....	.....	.....	.....	54.00
Youngstown	46.00	46.50	46.50	.....	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Producing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	.....	52.75	53.25	.....	.....
Boston	Steelton	6.27	54.27	54.77	55.27	55.77	60.27
Brooklyn	Bethlehem	3.90	51.90	.....	.....	.....	.....
Cincinnati	Birmingham	6.09	48.97	49.46	.....	.....	.....
Jersey City	Bethlehem	2.39	50.39	.....	.....	.....	.....
Los Angeles	Geneva-Ironton	6.93	52.93-61.93	53.43-43	.....	.....	.....
Mansfield	Cleveland-Toledo	3.03	49.03 48.53	·9.53-49.03	49.53	50.03	54.03
Philadelphia	Bethlehem	2.21	50.21	.....	.....	.....	.....
Philadelphia	Swedeland	1.31	51.31	51.81	52.31	52.81	.....
Philadelphia	Steelton	2.81	50.81	51.31	51.81	52.31	56.81
San Francisco	Geneva-Ironton	6.93	52.93-61.93	53.43-62.43	.....	.....	.....
Seattle	Geneva-Ironton	6.93	52.93-61.93	53.43-62.43	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	48.65	49.15	49.65	.....	.....

† Low Phos, Southern Grade

Producing point prices are subject to switching charges; silicon **differential (not to exceed 50¢ per ton for each 0.25 pct** silicon content in excess of base grade which is 1.75 to 2.25 pct for foundry iron); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct. C/L per g.t., f.o.b. Jackson, Ohio —$59.50; f.o.b. Buffalo, $60.75. Add $125 per ton for each additional 0.50 pct Si up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus $66.00 per gross ton, f.o.b. Lyles, Tenn. Delivered Chicago, $73.78. High phosphorus charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size.

F.o.b. Birmingham	$162
F.o.b. Niagara Falls, Alloy, W. Va., Welland, Ont.	$160
F.o.b. Johnstown, Pa.	$162
F.o.b. Sheridan, Pa.	$172
F.o.b. Etna, Pa.	$163

$2.00 for each 1% above 82% Mn; penalty, $2.00 for each 1% below 78%.

Briquets—Cents per pound of briquet, delivered, 66% contained Mn.

Carload, bulk	10.0
Ton lots	11.6
Less ton lots	12.5

Spiegeleisen

Contract prices gross ton, lump, f.o.b.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Palmerton, Pa.	$61.00	$62.00
Pgh. or Chicago	65.00	66.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, packed	35.5
Ton lots	37.0

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	28
Ton lots	30
Less ton lots	32

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, delivered.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	25.25	27.10	28.30
0.10% max. C	24.75	26.60	27.80
0.15% max. C	24.25	26.10	27.30
0.30% max. C	23.75	25.60	26.80
0.50% max. C	23.25	25.10	26.30
0.75% max. C, 7.00% max. Ci	20.25	22.10	23.30

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C.

Carload bulk	8.60
Ton lots	10.25
Briquet, contract basis, carlots, bulk delivered, per lb of briquet	10.0
Ton lots	11.6
Less ton lots	12.5

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, openhearth $84.00, foundry, $85.00; $84.75 f.o.b. Niagara Falls; Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 for each 0.50 pct. Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.

96% Si, 2% Fe	20.70
97% Si, 1% Fe	21.10

Silicon Briquets

Contract price, cents per pound of briquet, bulk, delivered, 40% Si, 1 lb Si briquets.

Carload, bulk	6.30
Ton lots	7.90
Less ton lots	8.80

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size, bulk, in carloads, delivered.

25% Si	18.50
50% Si	11.30
75% Si	13.50
85% Si	14.65
90-95% Si	16.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads, delivered. (65-72% Cr, 2% max. Si)

0.06% C	28.75
0.10% C	28.25
0.15% C	28.00
0.20% C	27.75
0.50% C	27.50
1.00% C	27.25
2.00% C	27.00
65-69% Cr, 4-9% C	20.50
62-66% Cr, 4-6% C, 6-9% Si	21.35

Briquets — Contract price, cents per pound of briquet, delivered, 60% chromium.

Carload, bulk	13.75
Ton lots	15.25
Less ton lots	16.15

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, delivered.

High carbon type: 60.65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	21.60
Ton lots	23.75
Less ton lots	25.25

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

Carloads	27.75
Ton lots	30.05
Less ton lots	31.85

Chromium Metal

Contract prices, cents per lb chromium contained packed, delivered, ton lots. 97% min. Cr, 1% max. Fe.

0.20% max. C	1.09
0.50% max. C	1.05
9.00% min. C	1.04

Calcium—Silicon

Contract price per lb of alloy, lump, delivered.

30-33% Ca, 60.65% Si, 3.00% max. Fe.

Carloads	17.90
Ton lots	21.00
Less ton lots	22.50

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	19.25
Ton lots	21.55
Less ton lots	22.55

CMSZ

Contract price, cents per pound of alloy, delivered.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25%Zr, 3.50-5.00% C.

Ton lots	19.75
Less ton lots	21.00

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots	15.75¢
Less ton lots	17.00¢

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Ton lots and carload packed	18.00¢
Less ton lots	19.50¢

SMZ

Contract price, cents per pound of alloy, delivered. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

Ton lots	17.25
Less ton lots	18.50

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, per pound contained W, 5 ton lots, delivered	$2.25
Ferrovanadium, 35-55%, contract basis, delivered, per pound, contained, V.	
Openhearth	$2.90
Crucible	3.00
High speed steel (Primos)	3.10
Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound contained V_2O_5	$1.20
Ferrocolumbium, 50-60% contract basis, delivered, per pound contained Cb.	
Ton lots	$2.90
Less ton lots	2.95
Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo.	$1.10
Calcium molybdate, 45-50%, f.o.b. Langeloth, Pa., per pound contained Mo.	96¢
Molybdenum oxide briquets, f.o.b. Langeloth, Pa., per pound contained Mo.	95¢
Ferrotitanium, 40%, regular grade, 10% C max., f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti	$1.28
Ferrotitanium, 25%, low carbon, f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti	$1.40
Less ton lots	1.45
Ferrotitanium, 15 to 19%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, carloads, per net ton	$160.00
Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton	$65.00
10 tons to less carload	75.00
Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.	
Ton lots	21.00¢
Zirconium, 12-15%, contract basis, lump, delivered, per pound of alloy.	
Carload, bulk	6.60¢
Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.	
Carload	8.90¢
Ton lots	9.80¢
Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound	
Carload, bulk	11.00¢
Ton lots, packed	11.25¢
Less ton lots	11.75¢

Boron Agents

Contract prices per pound of alloy delivered.

Ferroboron, 17.50% min. B, 1.50% max Si, 0.50% max. Al, 0.50% max. C, 1 in x D.	
Ton lot	$1.2
Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, delivered.	
Ton lots	$1.6
Less ton lots	1.7
Nickel—Boron 15-18% B, 1.00% max. Al 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.	
Less ton lots	$1.8
Silcaz, contract basis, delivered.	
Ton lots	45.00
Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.	
No. 1	93
No. 6	63
No. 79	45
Bortam, f.o.b. Niagara Falls	
Ton lots, per pound	45
Less ton lots, per pound	50
Carbortam, f.o.b. Suspension Bridge, N. Y.: freight allowed, Ti 15-18%, B 1.00-1.50%, Si 2.5-3.0%, Al 1.0-2.0%.	
Ton lots, per pound	8.625
Borosil, f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B	$6.2